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Nails, Spikes, Bolts, Rivets, Screws, &c.—W. Morgan-Brown (com.), 4365. J. H. Johnson (com.), 4430. A. M. Porteons, 4534. W. R. Lake (com.), 4542. R. Leigh, 4715.

Noxious Gases (Preventing and Arresting).—W. C. Woodhead, 4552.

Oiling or Lubricating, &c.—G. G. Munger, 4329. T. Manuell, 4379. J. A. Berly (com.)' 4419.

Oils, Fatty Matters, Grease.—C. S. Brittain and H. King, 4251. S. Parker, 4259. H. Simon (com.), 4301. E. R. Walker, 4455. J. Hardman and G. Wischin, 4517.

Optical Instruments.—W. H. Wells, 4213. W. and J. J. Kershaw, 4220.

Ornamenting.—J. Koch, 4665.

Ovens and Kilns.—J. R. Chibnall, 4230. R. Thomson, 4233. E. Leak and J. Edwards, 4298. T. Castle, 4328. F. Wirth (com.), 4381. R. Cosslett, 4520. R. Thompson, 4537.

Oxidation and Incrustation (Preventing and Removing.—F. S. Barff, 4195. R. Gregory, 4418.

Packing, Packing Cases, Arranging Goods fo Sale.—W. Morgan-Brown (com.), 4200. F. W. Parker and F. W. Barber, 4469.

Packing Pistons, &c.—H. J. Haddan (com.), 4196. H. J. Haddan (com.), 4204. I. B. Harris 4215. J. Scaife, 4291. A. W. Lake (com.), 4357.

Paints, Colours, Varnishes, Glazes and Lacquer; Painting, Colouring, and Varnishing.—S. J. J. Kelly and L. Chapman, 4307. W. Blandford, 4401. A. Harman, 4450. T. Smith, 4560.

Paper, Pasteboard and Papier Mâche; Paper Hangings.—H. C. Gros (com.), 4236. H. Simon (com.), 4301. J. T. King (com.), 4320. H. Stevenson, 4378. F. W. Matthes, 4503. G. H. Mallary, 4577. W. Haigh, 4615.

Pens, Penholders, Pencils, Pencil Cases.—H. A. Dufrene (com.), 4284. J. Larne, 4561. S. Fox, 4714.

Photography and Photographic Apparatus.—W. and J. J. Kershaw, 4220.

Pictures, Portraits, &c.—R. J. Coningsby and A. Grover, 4285. G. Hookham, 4441. J. Koch, 4665.

Pins and Needles.—M. B. Rowland, 4623.

Pipes, Tubes and Syphons; Joining Pipes.—J. Robertson, 4201. J. Chambers, 4207. S. Cutler, 4352. W. R. Lake (com.), 4461. R. Welford, 4564. J. R. Cassels and R. Hay, 4600. C. D. Abel (com.), 4675.

Pistons, &c.—J. B. Harris, 4215. W. T. Clark 4282.

Plants, Trees, Seaweeds, &c.—W. H. Smyth, 4567.

Ploughing, Digging, Clod Crushing, Land Rolling, Harrowing, Agricultural Implements, Tilling and Cultivating Land.—L. A. Aspinwall, 4470.

Preserving Miscellaneous Substances. — J. Delen, 4593.

Preserving and Preparing Articles of Food.—W. Morgan-Brown (com.), 4200. H. Simon (com.), 4301. E. J. Spitta, 4402. W. R. Lake (com.), 4497. J. Wilson, 4632. E. M. Nelson and J. R. Johnson, 4655.

Presses; Compressing.—C. S. Brittain and H. King, 4251. A. M. Clark (com.), 4427.

Printing and Transferring; Type and other Surfaces for Printing, Composing, and Distributing Type.—C. G. Squintain, 4437. G. K. Cooke, 4447. C. Dreyfus, 4453. W. N. Wise (com.), 4460. G. Mann and C. Pollard, 4508.

Propelling Carriages.—W. H. Phillips, 4519.

Propelling Machinery, Transmitting Power and Motion, Converting Movements.—J. Robertson, 4201. G. Archer, 4292. J. Little, 4211. H. J. Haddan (com.), 4530. C. Pieper (com.), 4572. T. Tuckey, 4682. A. M. Clark (com.), 4725.

Propelling Ships, Propellors, Paddle-wheels and Screws.—M. S. Hassfeld (com.), 4221. W. R. Lake (com.), 4340. F. A. Whelan, 4366. W. H. Phillips, 4519.

Pulleys.—W. Graham, 4323. W. R. Lake (com.), 4683.

Pumps, Pumping and Raising Water and other Liquids Pumps, Pistons, and Packing. — W. Clark (com.), 4198. C. Parsons, 4266. G. N. Fosbery, 4399. J. H. Johnson (com.), 4423.

Punching or Perforating.—G. Ratliffe, 4579. C. D. Abel (com.), 4675.

Purses and Purse Fastenings.—W. R. Lake (com.), 4448. F. Wirth (com.), 4657.

Railways, Permanent Way, Rail Joints, Chairs and Sleepers, Portable Railways, Atmospheric Railways, Switches, points, Crossings, and Turntables.—J. H. Johnson (com.), 4382. A. Greig, 4569. D. Biddle, 4583. J. Spielman, 4629. G. Lund and A. Burrows, 4672. G. E. Howell, 4697. T. Floyd, 4716.

Railways, Carriages, Coupling, Uncoupling and Altering Position of Carriages and Engines.—A. B. Ibbotson and F. J. Talbot, 4446. S. Chapman, 4484, W. L. Wise (com.), 4498. A. Greig, 4569. T. Layton, 4613. W. J. and R. T. Meredith, 4707.

Reaping, Mowing, Making Hay, Gathering in Produce.—L. A. Aspinwall, 4470.

Reflectors.—A. Wilkinson, 4217. F. Young and C. M. Dale, 4231.

Refrigerating, Cooling Liquids, Making Ice.—W. R. Lake (com.), 4497. M. P. W. Boulton, 4550. W. A. Gorman and M. G. Hudson, 4691.

Regisiering, &c.—A. G. Smith, 4189. H. A. Bonneville (com.), 4279. H. Tee, 4372. W. T. Roper, 4493. G. Westinghouse, 4619. T. W. Duffy, 4631. F. R. Francis, 4633. H. Ludeke, 4654.

Retorts and Crucibles.—G. W. Banton, 4296. T. Castle, 4328. E. R. Salwey, 4411.

Roadmaking, &c.—T. Birkbeck and J. Richardson, 4205. H. A. Bonneville (com.), 4322. G. E. Pritchett, 4428. H. J. Haddan (com.), 4587.

Salt.—T. Chadwick, H. Whitehead, and S. N. Cartlidge, 4262.

Sewing and Embroidering.—J. Little, 4211. A. Anderson and S. Browning, 4243. T. S. Tongue, 4260. A. M. Clark (com.), 4465. W. Fairweather, 4594. A. Melhado, 4699. T. Davies, 4706. G. W. von Nawrocki (com.), 4718. A. M. Clark (com.), 4725.

Ship and Boatbuilding.—W. Morgan-Brown (com.), 4250. W. Duncan, 4394. W. Richardson, 4395. R. Gregory, 4418. T. Greenwood and E. Groom, 4479.

Ships' Boats (Lowering, &c.)—W. Richardson, 4395.

Ships' Logs.—T. F. Walker, 4369.

Ships (Raising Sunken or Wrecked.—J. L. Clark, J. Standfield, and F. J. Bolton, 4527.

Shot, Shell, Bullets, &c.—W. Palliser, 4267.

Shuttles.—A. V. Newton (com.). 4271.

Sifting, Sorting, and Separating.—J. Bedford 4261. W. Pindar, 4350. F. D. Bumstead, 4412. E. Edwards, 4576. C. D. Abel (com.), 4676. J. I. Taylor, 4723.

Sign and Name Plates, &c.—A. A. St. V. Rich, 4608.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—W. Davenport, 4309. J. Harrison, 4358. W. R. Botterill, 4413. A. A. St. V. Rich, 4608. F. R. Francis, 4633. G. Lund and A. Burrows, 4672. C. F. Cooke, 4742.

Smoke (Preventing, Burning, and Condensing. M. Morton, 4609.

Sowing Seeds and Distributing Manure.—C. Urenicke and Riessler, 4532.

Spades, Shovels, &c.—W. Edwards, 4698.

Spinning and Preparing for Spinning.—J. A. Bright, 4242. H. W. Whitehead, 4246. E. Whitwain, 4327. J. H. Dickson and E. H. Hollands, 4339. E. Slatter, 4359. R. Guy, 4368. J. Stubley, 4415. C. D. Abel (com.), 4417. L. C. Marshall, 4472. G. Freemantle and G. Ashworth, 4488. A. Hardwick, 4509. G. H. Parker and F. J. and A. Crowther, 4524. S. Booth and T. Barlow, 4584. W. Brigden and J. W. Wilkinson, 4578. A. V. Newton (com.), 4597. J. Midgley, F. Bowes, J. Firth, and J. Pickle, 4599. L. Kaberry and T. Houghton, 4603. H. Whitaker, 4604. A. V. Newton (com.), 4621. E. Slater, 4678.

Springs.—W. Shuff, 4551.

Stamps and Stamping, Seals, &c.—G. K. Cooke, 4447.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water Feeding Apparatus for Boilers.—J. H. Johnson (com.), 4354. H. J. Haddan (com.), 4390. J. Auld, 4398. J. C. Newburn (com.), 4492. T. Archer, 4513. J. F. Flannery, 4515. W. R. Lake (com.), 4543. R. Welford, 4564. A. M. Clark (com.), 4624. J. C. Mewburn (com.), 4661. R. J. Ellis, 4722.

Steam Engines (Stationary, Locomotive, and Marine.)—H. Parker, 4193. J. B. Harris, 4215. A. B. Brown, 4255. C. A. Parsons, 4266. W. T. Clark, 4282. J. Apperley, 4293. R. Lindon and W. Russell, 4410. T. Smith and T. Kavanagh, 4417. J. A. Berly (com.), 4419. W. L. Wise (com.), 4499. E. Hall, 4500. G. W. von Nawrocki (com.), 4506. H. R. Lumley, 4596. T. Aveling and D. Greig, 4598. M. Silvester, 4648. W. Dawes, 4677. T. Tuckey, 4682. H. Hughes, 4720. R. J. Ellis, 4722.

Steering or Guiding Ships, Carriages, Ploughs, &c.—W. Davenport, 4209. M. S. Hassfeld (com.) 3221. A. W. Smyth, 4238. F. R. Francis, 4633. J. W. Watson, 4660.

Stone and Slate, Artificial Stone and Marble Grindstones and Millstones.—F. Ransome, 4664.

Sugar and Syrups, &c.—H. Simon (com.), 4301. A. Scott and A. M'Donald, 4376. H. J. Haddan (com.), 4586. F. Wirth (com.), 4695.

Telegraphs; Telegraph Printing Apparatus.—J. F. Bailey, 4201. W. R. Lake (com.), 4340. E. Berthand and F. Borel, 4346. J. F. Bailey (com.), 4369. S. F. van Choate, 4388. E. T. Truman, 4430. H. J. Haddan (com.), 4528. H. J. Haddan (com.), 4529. J. Muirhead (com.), 4590. B. Hunt (com.), 4601. C. E. Crighton, 4696.

Testing Strength of Metals, &c.—D. G. Lewis, 4667.

Thrashing Machines.—J. Marshall, 4435.

Threads and Yarns.—M. B. Rowland, 4623.

Tobacco and Snuff, Cigars, Cigar-holders, Pipe and Cigar-lighters, Smoking-pipes, Tobacco-pouches.—C. Kesseler (com.), 4187. H. J. Haddan (com.), 4467. G. M. Jacobs, 4702.

Tools, Tool Holders.—W. Edwards, 4698.

Tramways and Tramway Carriages, Tramway Locomotives.—J. Spielmann, 4224. R. Bishop, 4264. J. Rae, 4302. J. B. Colbran, 4496. S. E. Howell, 4697. W. J. and R. T. Meredith, 4707. H. Hughes, 4720. H. T. M'Neale, 4721.

Trimmings.—F. W. Parker and F. W. Barber, 4469.

Umbrellas, Parasols, &c.—D. Elkan, 4277.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—H. J. Haddan (com.), 4196. H. J. Haddan (com.), 4204. P. Ramage, 4253. C. A. Parsons, 4266. W. T. Clark, 4282. E. A. Sniggs, 4238. J. Rhodes (com.), 4289. J. Brunton (com.), 4309. S. Johnson, 4312. S. Cutler, 4352. H. Bancroft, 4414. T. Lumley and S. Kavanagh, 4417. W. Wright, 4514. J. F. Flannery, 4515. F. P. and E. J. Preston, J. T. Prestige, J. A. Fowler, and W. G. Simmons, 4539.

Velocipedes, Bicycles.—G. Singer, 4265. E. Seed and R. Woods, 4335. J. Harrison, 4358.

W. R. Botterill, 4415. J. Bate, 4675. S. M. and K. Starley, 4657.

Ventilation; Supplying and Purifying Air for Buildings, Mines, Ships, Carriages, &c.—G. E. Pritchett, 4428. C. J. Henderson, 4429. W. Swain, 4495. W. C. Woodhead, 4552. R. Nevill, 4592. G. Weston, 4657. G. Ewart, 4708.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials. — A. Barraclough, 4305. J. Maude, 4607.

Waterclosets, &c.—S. Johnson, 4312. J. Bannehr, 4565.

Waterwheels and Engines, &c.—J. W. Gray (com.), 4638.

Waterproofing, &c.—G. E. Pritchett, 4428.

Weaving, Braiding, Plaiting Preparing for Weaving.—A. V. Newton (com.), 4214. J. H. Johnson (com.), 4218. J. Radford, 4248. A. V. Newton (com.), 4271. D. N. Smith, 4540. G. F. Bradbury and H. Lomax, 4555. T. Emmett and W. Hurst, 4570. T. A. Jones, 4574. W. Parker, 4620. C. H. Taylor, 4659.

Weighing Machines, Scales, Indicating Weight. —W. Morgan-Brown (com.), 4237. J. C. Mewburn (com.), 4454.

Wheels for Carriages. &c.—E. Perrett, 4199. W. L. Wise (com.), 4222. J. Reilly, 4229. W. Graham, 4323. J. Bate, 4265.

Wheels for Machinery.—W. Graham, 4323.

Winding Thread, &c.—A. Anderson and G. Browning, 4243. G. Warburton, 4704.

Window Blinds, &c.—G. Davis, 4364. J. Jeal, 4471.

Windows and Sashes.—J. E. Walsh, 4384. W. J. E. and E. J. E. Henley, 4409. W. Turner, 4436. T. H. Collins, 4523. H. Hancock, 4580.

Wire-Working, Wire Ropes, Telegraph Cables.—J. Robertson, 4201. E. Berthaud and F. Boral, 4346. E. T. Truman, 4438. G. Hooker, 4441. W. R. Lake (com.), 4541. B. Hunt (com.) 4601. D. G. Lewis, 4667.

Woods and Veneers, &c.—G. H. Mallam, 4577.

Yeast.—S. Griffin and T. Pierce, 4477. G. W. von Nawrocki (com.), 4533.

⁂ *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

REMARKABLE GAS WELLS IN OHIO.

A correspondent of the Cleveland *Leader* says that the natural gas wells of East Liverpool, Ohio, form one of the seven wonders of the world. They are situated in and around the city, and give it a continual supply of the finest light. The gas is almost as free as the air. It costs practically nothing, and forms the illuminator and heater of the town. The city is lighted by it, and the street lamps blaze away at noonday as well as at midnight. It costs nothing to let them burn, and it takes trouble to put them out. Its light is not the flickering mockery of poorly manufactured gas, but a flame which proximates in its brilliancy that of the electric light. Almost the entire fuel used in the town is this gas. It is conducted into the stoves and grates in pipes, and by it all the cooking and heating are done. It is also used in furnishing steam power for many of the largest pottery and ironstone china manufacturing establishments, twenty-two of which are in operation and busily engaged, employing over two thousand hands, and which it is considered justly entitled East Liverpool to be considered as "the ceramic city" of America. Regarding the duration of the supply from these wells, it is stated that the first well discovered now burns as brightly as when it was first opened, and for the last twenty years has never flagged in its brilliancy, and none of those now in operation have ever shown any signs of giving out. For years Liverpool used manufactured gas, never dreaming of the rich supply that was wasting away daily under its very feet. The poor quality of the manufactured product induced the opening of the first well in 1859. This well, which is 450 feet deep, has been furnishing fuel and light to several houses, producing the steam for a large engine, and burning pottery kilns, every day for over twenty years.

Reviews.

KINGZETT'S ANIMAL CHEMISTRY.

"Animal Chemistry, or the Relations of Chemistry to Physiology and Pathology." A Manual for Medical Men and Scientific Chemists. By Charles Thos. Kingzett, F.C.S., Member of Council of the Institute of Chemistry of Great Britain and Ireland; Author of "History, Products, and Processes of the Alkali Trade," &c., London: Longmans, Green, & Co. 1878.

The interest and importance of the subject-matter of this work cannot be over-rated, for without doubt the knowledge of the chemical composition of the products and educts of the bodies of men and animals of various kinds must be of great value to the medical profession, and of no small importance to all students of chemistry and physiology. But although the subject-matter of the work is thus highly placed, the manner in which Mr. Kingzett has dealt with it in the present work is likely to place it still higher by increasing the number of persons possessing *quantum suf.* of knowledge with regard thereto,—for it is scarcely too much to say that Mr. Kingzett presents to the reader in a well-arranged way a mass of information that had existence only in a form that one might almost term chaotic, and we feel the full force of his remarks that the task has proved heavy. However (Mr. Kingzett remarks) he has tried to do the work faithfully and to the best of his ability, and if he has wronged any investigator it has been done unconsciously. He adds:—"I may explain that it has not been my object to collate every fact which may fairly be included in the subject of physiological chemistry, nor to detail well-known methods of analysis, but rather to present, in as natural an order as possible, all those parts of the subject which, when properly arranged, present something like a system. In doing this, the various methods of research have been particularly described, and even researches published up to date have been included; further, I have endeavoured to comprehend in the scheme of the work every known subject having a direct relation with the objects of animal chemistry. The proper understanding of the book will depend to a large extent upon the reader's knowledge of chemistry; but this is inevitable; and as pure chemistry is taught to some extent in our medical schools, and so well treated in many excellent text-books, I have not thought it necessary to enter into the subject except in an incidental manner here and there. I have availed myself freely of all existing treatises upon the subject of this work, and have given full references." The chapters are, the first—introductory, in which the labours of Boerhaave and other early physiologists are detailed; the second, life from a chemical point of view; third, chemistry as applied to physiology and pathology. In other chapters the organs, fluids, and processes concerned in digestion are treated of. And in Part III., nutrition, or "work and waste;" whilst in Part IV., other organs, tissues, and fluids of the body are fully considered; and in Part V., albuminous principles, including pepsin and peptones, animal carbo-hydrates, fats and fatty acids of the human body; the Pettenkoffer reaction; fermentation, putrefaction, also antiseptics and disinfectants, and the physiological action of chemical substances are all of them thoroughly investigated, and the work concludes with a chapter showing how animal chemistry might be advanced.

MR. SMEE'S HOUSE SURGEON.

"The House Surgeon, or the Doctor at Home."

Under this title a useful little illustrated work has been issued by the Accident Insurance Company (Limited), 7, Bank-buildings, containing a number of brief practical directions for the treatment of sufferers from accidents. These hints, which are from the pen of the late Mr. Alfred Smee, surgeon to the Bank of England, &c., are intended for the guidance of the patient's friends until medical assistance can be obtained, and in some cases close attention to them may even render such assistance unnecessary. The subjects are just those upon which such brief, trustworthy directions as are here offered are needed from time to time, the list including broken bones, cuts, bruises, fits, apparently drowning, dislocations, ailments of the eye, burns and scalds, sunstroke, and a number of other matters of frequent occurrence requiring prompt and well-directed action.

EDWIN CLARK'S SOUTH AMERICA.

"A Visit to South America; with Notes and Observations on the Moral and Physical Features of the Country, and Incidents of the Voyage." By Edwin Clark, Mem. Ins. Civ. Engineers, F.R.A.S., F.M.S., &c., &c., Author of "Britannia and Conway Tubular Bridges." London: Dean & Son, 160A, Fleet-street, E.C. 1878.

This is a very interesting and instructive work, which goes far to prove the view thrown out by Mr. Clark in his preface that the civil engineer in the highest acceptation of the term is not, so to speak, a sublimated technologist and practitioner merely, but is also "an engineering philosopher" acquainted with the whole subject of terrestrial physics. In order that our readers may have a general knowledge of the contents of this commendable work we present to the reader the author's own statement in regard thereto:—

"The following pages contain the substance of notes made in 1876 and 1877 during a journey to the River Plate and a residence of nearly two years in Buenos Ayres, Paraguay, and Uruguay. So far as the notes are concerned they are given in the order in which they were written, and with little alteration. They thus form a text for various observations and explanations with which they are interwoven. Such a course often involves repetition, and even discordant views on the same subject, but it has the advantage of preserving that freshness and authenticity peculiar to notes written in the presence of scenes described. I must mention that I laboured throughout under the serious disadvantage of possessing no library of reference. The only books I possessed were Hooker and Decaizne's invaluable manual of botany, Nystrom's American pocket-book of mechanics and engineering, with its useful collection of tables and formulæ—a remarkable compilation, but unfortunately vitiated by its many typographical and other errors; and Darwin's 'Naturalist's Voyage in the Beagle,' a book of which it is impossible to speak too highly, but which can only be thoroughly appreciated by those who have witnessed the countries he describes and realised the marvellous accuracy and eloquence of his descriptions. Considerable attention was given to the natural history and meteorology of the country, and the notes and views on these subjects were far too voluminous for a book of this description; but though I have omitted all detailed observations, it is hoped that the meteorologist and botanist will not fail to find original matter on these topics which will excite his interest. A very large space has been devoted to the description of Paraguay, not only on account of the extreme interest which its sad history and marvellous beauty excited, but also on account of the great dearth of existing information that is available for the solution of the very remarkable physical and moral problems to which they give rise. My professional brethren will doubtless be disappointed in finding so small an amount of information on subjects of engineering interest, but it must be borne in mind that the level plains of the pampas furnish little scope for engineering works of novelty or magnitude, whilst the vast and fertile regions beyond, though offering a field of unbounded importance and interest for future enterprise, are as yet unpeopled, and even unexplored. On the other hand, I have always been inclined to assign a much larger range to the subjects that essentially come within the province of the civil engineer than is usually admitted, the mere technical or practical portion forming in my opinion only a single branch of the great science of engineering philosophy, which includes the whole subject of terrestrial physics, and in that sense some of the following pages may serve as elementary lessons for the young engineer."

We consider that Mr. Clark has well carried out his views and intentions in publishing this work, which, we may add, is no dry scientific treatise, but a book of pleasant reading, containing much important information.

THE MODULUS OF ELASTICITY.

Up to a certain limit a body lengthens, shortens, or bends equally under equal additions of load; beyond this point this is not true; if it were, a rod could be doubled in length or shortened to nothing. This load in pounds, which would, at this rate, stretch to double length or compress to nothing a bar one inch square of any material, is the modulus of elasticity.

It is thus an imaginary load, bearing the same proportion to a load producing any given amount of stretch, as the original length of a uniform bar is to the length of this stretch.

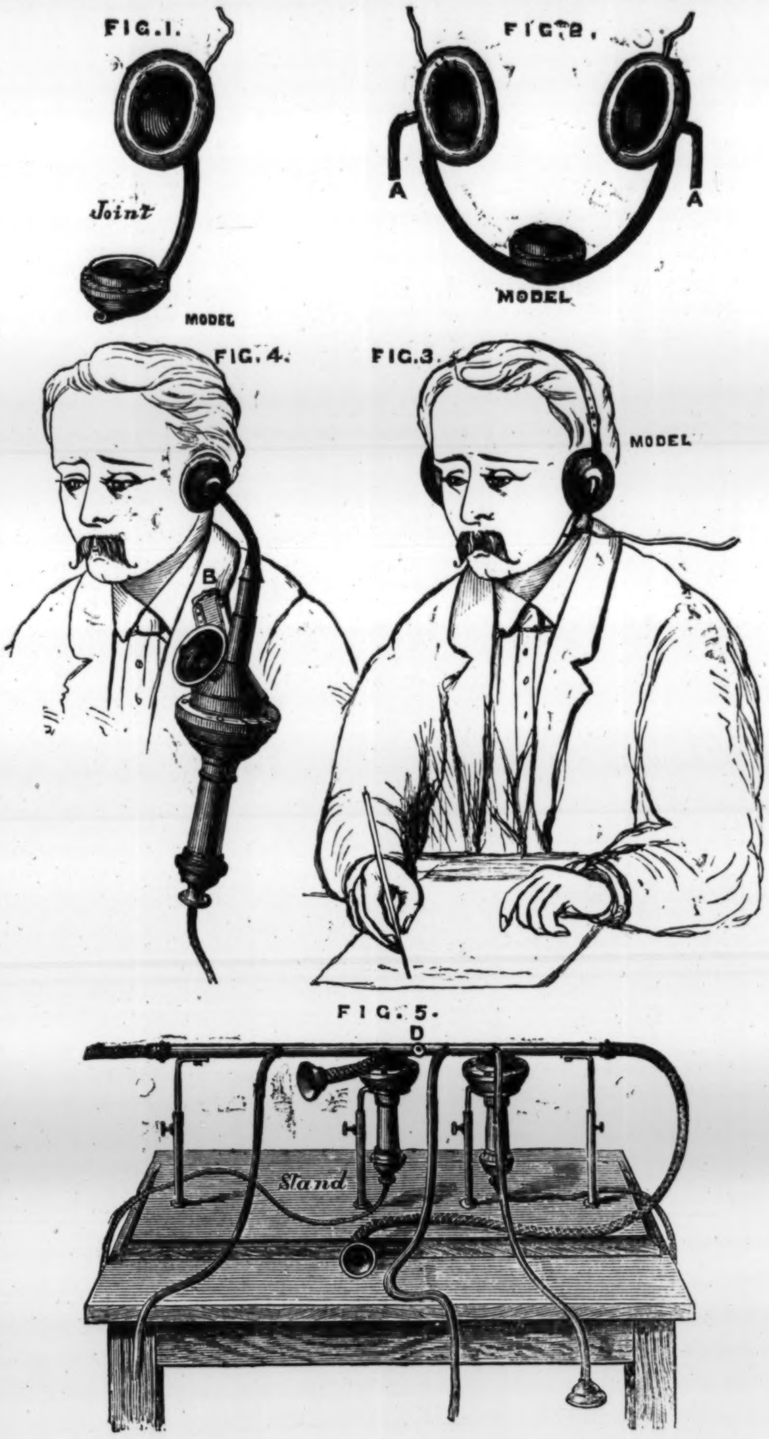
And the use of this assumed weight or load is to render easy certain calculations. Thus, to find the load in pounds required to produce a given stretch within the elastic limits, is equal to the required stretch multiplied by the modulus of elasticity, and by the cross section, and divided by the original length. And to find the stretch produced by any load within the elastic limit, the product of the load by the length must be divided by the modulus times the cross section.

It may be interesting in this connection to enumerate some of the strengths of various metals in pounds per square inch. It should be borne in mind that large metal bars are weaker in proportion to area than small ones; and that cold-rolled iron bars, although not any denser, are from $\frac{1}{4}$ to $\frac{1}{2}$ stronger.

Cast brass stands about 18,000 lbs., while annealed brass wire is equal to 49,000, and hard or unannealed, 80,000. Copper sheet, 30,000; bolts, 36,000; wire, 60,000. Gun metal (copper and tin), from 22,000 to 39,000. There is a cast iron called gun metal that is good for 38,000. English cast iron, 18,000; American, very much higher, which must be taken in consideration when Englishmen and others call American machine framing light. Wrought iron rolled bars, 40,000 to 75,000; best American, 76,000; Low Moor, 6,000; plates, 50,000; hard wire, 75,000; wire ropes, 38,000; large forgings, 35,000. English steel plates, 65,000 to 103,000; Hussey, of Pittsburg, 95,000; Bessemer, 98,500; Bessemer tool steel, 112,000; wire, 200,000 to 250,000; rolled and hammered Bessemer ingots, 125,000; cherry red tempered, 214,400; chrome steel, 18,000. The strongest steel stretches the least.

The rage for exhibitions has now spread even to Central Asia. The latest news from Tashkend states that an agricultural and industrial exhibition is about to be held there. Great preparations are being made for it at Samarcand, and the Government has promised gold and silver medals to the exhibitors, as well as—honorary caftans!

PRITCHETT'S IMPROVEMENTS IN TELEPHONIC APPARATUS.



Telephones, as now generally used, consist in the well-known instruments held by the hand, applied to the ear and to the mouth for receiving or transmitting purposes.

By a patent recently published, the disadvantage and uncertainty consequent upon shifting the instrument, or by using two separate instruments, is obviated.

One form of instrument covered by the patent is shown by model, figure 1. One end of a hinged magnetised covered bar is fitted with a padded receiving ear-piece, and its other end is fitted with a transmitting mouth-piece. This instrument is held by one hand and adjusted to the ear and the mouth by one motion, obviating any shifting or the necessity of having to use two telephones. Another great advantage is that this form of instrument leaves one hand free for writing or reporting as the messages arrive at the ear, whilst at the following moment the user can transmit or ask for a repetition of a message or word by means of the mouth-piece. This form of instrument the patentee, Mr. G. E. Pritchett, F.S.A., of Bishop Stortford, Herts, terms a dual instrument.

Another form, figure II. shews nearly a similar arrangement in a triple form. It has two ear-pieces for receiving and one mouth-piece for transmitting purposes, and is held by the handles in the figure. The ear-pieces in both figures being padded deaden external sounds, and make the instruments, which are light and handy, very useful. Both instruments can be folded up and placed in the pocket, or in a small case, and connected and disconnected at will with circuits as required.

Figure III. is a very handy form of instrument, where it is desirable to have both hands free for writing, &c. It consists of a pair of bent magnetised bars fitted with padded ear pieces and adjusted to the ears; these ear-pieces are secured to the ears by an elastic band passing under the chin and over the head. The wires are connected up in the usual way, and brought from any convenient point or from a reel as may be desired; thus both hands of the persons receiving are free, who can report, write, and manipulate with other instruments at will. A tube may be inserted above the disc for transmitting as required. It cannot fail to be seen how useful such instruments will be to gentlemen connected with the Press or law courts; whilst for transmitting purposes Nos. I. and II. are adopted for relay, as the operator can transmit as rapidly as he receives, it being only necessary to connect up the mouth-pieces with the required circuits by bringing the electric switch into use.

Figure IV. shows the inventor's method of capping existing telephone cases, so as to form them into multiple instruments. The caps are formed of any suitable material, and attached to the top of the telephone. A clip at B is adjusted to fasten on to a coat collar, or a strap or button may be used to suspend the telephone. From the cap or caps a self-adjusting tube is carried up and adapted by a pad or otherwise to the ear, or the tube may also be carried on to the other ear, and secured by an elastic band, so as to bring both ears into use for receiving. A mouth-piece is also formed in the caps for transmitting purposes as shown at C; thus the hands of the person using the telephones are entirely free for writing or manipulating, as before mentioned, and one telephone takes the place of two or more if desired.

Figure V. shows ordinary telephone cases mounted on an adjusting stand, which can be placed on a table. Above the telephones a horizontal hollow bar is adjusted and provided with projecting pieces fitting down into the mouth of the telephones. From this bar several elastic tubes can be led off and handled, and used for receiving or transmitting purposes. For example, a number of reporters could one and all receive and note down speeches or evidence at the same moment. Singing, music, &c., could be heard by many persons simultaneously. By the use of a valve or damper, D, in the hollow bar, one or more circuits can be brought into operation both for receiving and transmitting purposes. Many serviceable uses can be made of this appliance. The same remark applies equally to the other figures. The arrangements for padding the ear-pieces must not be lost sight of, as their use deadens general sounds and much assists the receiver. These pads are built up of materials adapted to stop and check sound. Compared with the telephones now in common use, the new models are certainly much more handy, and will greatly facilitate accuracy of delivery and speed in transmission. These telephonic arrangements are open to variation in detail, but the ground covered by Mr. Pritchett's patent is comprehensive, and is likely to be of much public utility.

Mr. Charles K. Conner, of Camp Point, Ill., has patented an improved machine for husking corn from the stalks while standing in the field; it is simple, convenient, and effective, removing the ears from the stalks and husking them as it is drawn forward throught the field, husking one row at a time.

THE MODERATOR ELECTRIC LIGHT.

LAST month, in our article on "Lighting in the Future," we made special allusion to M. Rapieff's invention. We now state some further particulars:—The light is produced from two pairs of carbons placed one above the other, the upper pair being inclined towards each other in V form, and the lower similarly inclined, but in Λ form, the point of ignition being the junction of the two points of the V's. The lower pair, moreover, is placed at right angles with the upper, so that seen in plan they would form a cross. They can, however, be placed in any other relative position without in any way interfering with the results. The carbons at present used are 18 inches long and of varying diameters, according to requirements. They are carried in fixed holders, so arranged that the points of one pair are always approaching towards those of the other pair. The carbons are kept in juxtaposition by means of a fine endless cord, on which is suspended a weight, the cord passing over a small pulley attached to each holder. It is so adjusted that every part is in equal balance or tension, and the descending weight draws the carbons together, following up their consumption in the most precise manner. The carbons are free to slide through their holders, either small friction pulleys or copper-wire brushes being used to facilitate their forward movement and to insure their exact position at all times. The pulleys also act as conductors of the electric current. The top holder is capable of adjustment, by means of a set screw, for increasing or diminishing the length of the Voltaic arc, according as there are a greater or lesser number of lights in the circuit, several lights requiring, of course, a smaller arc—or, in other words, more closely-placed carbons than a single one.

Having once determined and fixed the length of the Voltaic arc, the distance invariably remains the same until the carbons are consumed, unless anything occurs to interrupt the current. Should the current, however, be broken or interrupted from any cause, another beautiful arrangement comes into operation by means of which the light is instantly restored. Its continuity, indeed, can hardly be said to have been broken, so inappreciable is the time between the extinction and reappearance of the light. It is, in fact, a mere wink of the light. The lower carbon holder is itself a small electro magnet, which, while the current is flowing freely and uninterruptedly through to the carbon, is held up to an armature fixed over it at the opposite end to that at which the carbon is held. Immediately between these two points the arm of the holder is pivoted to the framing of the apparatus, and the holder is capable of a slight play on this pivot, similar to the motion of a scale beam. Upon the current being momentarily interrupted, contact between the rear end of the holder and the armature is broken, and the front end of the holder, with its carbons, is instantaneously drawn upwards by means of a small spiral spring, and the carbons making contact the light is instantly re-established. This re-establishment of the current of course means immediate contact between the electro-magnet and the armature, and the Voltaic arc is again fixed. By means of this ingenious and exceedingly simple self-acting arrangement, the light is made practically continuous and the necessity for all complex clockwork arrangements entirely avoided. The currents are led from the wires up rods, the positive to the upper pair of carbons and the negative to the lower pair. By having the positive current at the top and the negative at the bottom, the light is thrown downwards owing to the concavity of the burning surface of the upper carbon point. By reversing the currents there is a reverse result, the light being thrown upwards. The change of carbons is effected without in any way interfering with the continuity of the light. It will be remembered that four carbons are used, so that by withdrawing one at a time when nearly consumed and replacing each by a fresh one, no interruption whatever is caused in the illumination. Another point gained by the use of four carbons in the moderator system, as against two in ordinary, is the production of a continuous light for double the length of time any other system will give, without change of carbons, the carbons being, of course, of the same dimensions in each case. The light from the carbons is transmitted through opal-tinted glass globes, and a steady, bright, but not by any means intensely brilliant light is diffused around. There is also an absence of those dense black shadows so generally caused by the electric light. In short, a useful and agreeable light which can be moderated to suit all circumstances is produced. It may be interesting to our readers to state that the development of this institution is being effected under the immediate auspices of Mr. E. J. Reed, C.B., M.P., who some years since made a very complete study of electricity and electric lighting. Having become acquainted with M. Rapieff's inventions in this direction, Mr. Reed made arrangements with him to put them into practical shape. This has been done under the detailed management of Mr. R. Applegarth, whose name is not unknown in connection with the subject of electrical lighting.

ALIZARIN CARMINE, A NEW TINCTORIAL SUBSTANCE.

THIS compound, recently introduced into the market as a dye for woollens, is the sodium salt of a sulpho-acid of alizarin. With the ordinary mordants it gives a variety of brown, chocolate, orange red, and scarlet shades. The latter, though inferior in brightness to cochineal and eosin scarlets, are absolutely fast as against air and light, and are injured neither by soap lyes nor by perspiration. The new colour, therefore, will be well adapted for carpets, hangings, military uniforms, &c.

MORE SCHOOL BOARD TYRANNY.

WE did hope that the London School Board, now presided over by Sir Charles Reed, who is so often spoken of in terms of commendation, had begun to abstain from that pragmatic despotism which threatened to render every Englishman's life intolerable who happened to live under its malign influence. However, we find ourselves mistaken, and have now to chronicle as gross a case of tyranny as can well be conceived. As reported by the daily journals:—"A blacksmith, stated to be in a good position, was summoned at the Worship-street Police-court for not sending his child to a Board School, a private school to which it was regularly sent being pronounced inefficient. The mother stated that she preferred keeping her son where he was, because at the Board School where he had been he learned to use bad language. Mr. Bushby nevertheless made an order for the child to be sent to a Board School." The whole case is one of great gravity for the system which is upheld by this sapient magisterial decision—overthrows parental power, and makes of no account the effect of evil associations upon youth—as the fact which the magistrate seems to have pooh-pooh'd is a fact nevertheless, for where a large number of boys are brought together, without selection, bad language and many other bad practices are rife. Further, the effect of forcing all children into School Board schools will be that there will be only one system of education for the great bulk of the people, and that the individuality and independence of character which Englishmen formerly possessed will be entirely lost. There also arises the small matter of increased expenditure on Board Schools which the ratepayers had better look to.

FOREIGN SCIENCE.

A SERIES of interesting experiments have recently been made in the great balloon at Paris by M. Perrier, with the object of ascertaining the qualities and different peculiarities of the various constructions of aneroid and other barometers which were exhibited in the Exposition Universelle. Each of the French makers who had received medals for their exhibits forwarded two instruments to M. Perrier, to assist him in his object, and these were compared some five or six times with a standard barometer placed at the foot of the cable of the balloon. He ascertained that the indications given by a great many of the barometers tested were by no means correct, or in accordance with the standard instrument.

Some excavations which have been carried on lately at Neuchatel, in Switzerland, have resulted, among other things, in the discovery of several interesting objects, buried at a great depth; amongst which may be named a boat made of oak wood, about twenty-four feet in length, some gold earrings and other articles of jewellery of exquisite workmanship, and a large piece of amber in an almost perfect state of preservation.

The microphone and other instruments of similar construction have been experimented with in France in endeavouring to ascertain what are the auditory powers of insects, and the difference of this power in various species.

It is announced in some of the Continental journals that a scheme is now on foot in Rome for the construction of a railway from that city to ascend Mount Vesuvius. The line it appears will be made somewhat on the same principle as the American elevated railways, the rails being supported on a series of columns.

At the fourth of the series of conferences held by the Geographical Society of Paris, on the 2nd of last month, the subject under discussion was the application of electric telegraphy for military purposes. The object of these conferences was mentioned, it will be remembered, in our last issue.

M. Joseph Vinot, the well-known astronomer, is about to commence giving a series of lectures on astronomy in Paris, to which the public will be admitted gratuitously.

An ingenious arrangement for postal envelopes, for facilitating the printing or impressing of stamps on their exterior surfaces without injuring the contents in any way, has been devised by M. Depelley, an official in the central department of the French Post-office. The principal point of the invention consists in the application of a sensitive chemical preparation to the inside of the envelope, which does not increase the cost, and which, in combination with a special arrangment for stamping, of very simple construction, causes the part stamped to instantly undergo a change of colour.

FAREWELL.

CALL back the past, when in the grey
Dim hour of dawn you watch for day;
Chasing the ling'ring charm of sleep,
To vainly long, to vainly weep!

Call back the past, when sunny hours
Give each sought joy 'mid life's bright
flowers,
And mammon's proud, successful smile,
Dazzles the soul life claimed a while.

Call back the past, when twilight's peace
Brings your vain world-bound soul release;
When the sweet sadness of the time
Breathes thought, like an æolian chime!

Call back the past, in midnight dreams,
At noon, at eve, in dawning beams;
But come not near me to o'ercast
My memory of the sacred past.

V. GONVILLE.

BARANOWSKI'S PATENT MECHANICAL WAY-BILL.

To the panel of the door, or other part of the vehicle to which the apparatus can be fixed (though, as its weight is only about one pound, it might be carried by the conductor) a box, in metal or in wood, is attached, containing the principal mechanism, having a cover, which is to be locked until the account of the conductor is settled. In this cover are apertures for the exhibition of figures marking the successive number of passengers and the total amount paid to the conductor for each fare. There are also other apertures through the cover for the play of working levers, each composed of four branches turning inside the box, but only one branch is projected outside as handle for the operation, which is fully described herewith in the fourth paragraph of "principal advantages." There are holes through both sides of the box, under the branches of the levers, into which the conductor can introduce a rod, in iron, for stopping any operation during his absence from the vehicle.

The principal advantages claimed for this invention are—(1). The dimensions of the mechanical way-bill, which are about the snme as those of the way-bill now in use in omnibuses for marking the fares with a pencil. (2). The mechanism is so combined that it cannot get out of order, and may be applied, with slight increase of the width of the box, to check the daily journeys of each vehicle. (3). The cost price of each apparatus (if manufactured in certain quantities) will be about £2 for one single fare, £3 for two different fares, and so on, adding £1 for each subsequent fare. (4). The mode of operation is simple and instantaneous. After receiving the fare, the conductor has only to lower a lever corresponding to that fare, which is immediately registered and added to the other fares at the same rate previously recorded. This registration appears in figures marking shillings and pence, and, by the same operation, the successive number of passengers is also registered in figures of a different colour. (5). The mechanism is so arranged that the exhibited figures in the apertures cannot be removed back, except by opening the box with the key to be kept by the company, who would have to put the figures at 0 after each settlement with the conductor. (6.) Finally, each operation is announced by the sound of a bell, which, being heard by the passengers, an important additional check is thus secured. According to the drawing and the model constructed for practical demonstration of the above advantages, the bell is inside the box, but it can be placed outside, if preferred.

The inventor of this mechanical way-bill is John Joseph Baranowski, engineer, of 10, Duke-street, St. James's, S.W.

IMPROVEMENTS IN PACKING GLANDS OF ENGINES.

WE present a description of this noteworthy invention in the words of the inventor, Mr. E. M. B. Faull, of Newport, Monmouthshire:—

"I employ a ring of gun metal, or it may be of other metal. This ring, bored out to fit the rod which is intended to work through it, is coned or tapered at its ends, and it is divided into three or other number of parts. This ring is used preferably in conjunction with two other rings which are hollowed out to correspond to and receive the coned ends of the divided ring.

"At the bottom of the gland one of the last-mentioned rings is placed, and within the hollow of this ring the several parts of the divided ring are arranged around the rod. Similarly the third ring is placed on the top of the divided ring, the coned end of the divided ring being received into the corresponding hollow of the upper ring.

"One turn of ordinary fibrous packing to absorb the oil or lubricant, is put in over the upper ring, and the gland screwed down lightly.

"By the action of the inclined surfaces upon the rings, the one against the other, the parts of the divided ring are drawn inwards, and made to embrace the rod closely.

"In order more effectually to prevent the escape of steam, the divisions between the parts of the divided ring are made in an oblique and zigzag direction.

We quote below the result of using the above packing on board the s.s. Lady Tredegar, with marvellous effect and most astonishing economy, effecting a saving of packing of at least 400 per cent., as follows:—The experimental gland formerly took five turns of packing; three-fifths was at first taken out, and afterwards another, or fourth turn, leaving only one turn in the gland; the saving being, therefore—packing=equal 80 per cent.; durability to the present time five times as long as with any other packing=400 per cent. In addition to the above, there is a large amount of labour saved in cutting out old and repacking glands.

Chief-Engineer's Report, s.s. Lady Tredegar, September 13th, 1878:—"To Mr. E. Faull. Sir,—I have tried your new gunmetal packing in the most troublesome gland we have on our engine—tail end high pressure rod. We have made the following voyages since we have had it in: from London to Bilbao; thence to Newport; Newport to Bilbao; Bilbao to Newport; Newport again to Bilbao; and it is likely to run as many voyages again. In fact, I cannot estimate the length of time it will run without being touched—it having as yet shown no sign of leaking, nor have I required to touch it, except screwing it down with my fingers only. I have been in the above boat as chief engineer for the last three years; during that time I have never run more than one voyage without repacking with asbestos or Tuck's, and have had frequently to stop at sea, sometimes twice or three times on the passage, to repack this gland. I have now only two turns of core packing; I previously used five turns, and on the next passage I intend to use only one, and will report the result to you on my return.—(Signed) GEORGE BRAGG, chief engineer of the above ship."

Other testimonials have been obtained, but our space will not permit us to present them to the public.

Correspondence.

VENTILATION OF MINES.

TO THE EDITOR OF THE SCIENTIFIC AND LITERARY REVIEW.

SIR,—I read in Macmillan's "Science Primer on Chemistry" that coal gas (collected in retorts) can find exemplification in the bowl of a common long tobacco pipe and also in the wick of a candle, &c. Would you allow me to ask whether it would be possible to prevent accidents in coal-pits by having a long pipe of metallic gauze (a Davy pipe instead of a Davy lamp) from the top to the bottom of the shaft of the coal pit, open just at the bottom to admit the ascent of the coal-gas, and with something of a vane at the top—such as is occasionally put on the top of chimneys—to draw. If not *quite* an unreasonable suggestion, perhaps, if you would admit it, some one might improve on the hint. H. B

An improvement in oscillating steam valves has been patented by Mr. Charles J. Van Depoele, of Detroit, Mich. The object of ths invention is to simplify the constructon of the valves of steam-engines, and to reduce the friction and wear to a minimum.

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SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President, SIR ANTONIO BRADY.

SESSION 1878—1879

Members' Meeting—Thursday, December 12th, at 8.15 p.m.

[In consequence of the Inventors' Dinner being fixed for half-past six p.m. on this day, this meeting will take place at five p.m. Executive Council at half-past four p.m.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

THE Executive Council has during the past month transacted usual general business only, which needs no report.

The Members' meeting on 28th November was occupied by the consideration of the position and prospects of the Patent Law question in the ensuing Session of Parliament.

Monthly Notices.

The bronze plates of the gate at Balawat, found by Mr. Rassam, are being repaired, progress having already been made. They represent the events of the reign of Shalmaneser II., not Assurnazirpal, and the conquest of Hamath, Aradus Carchemish, and other places.

"*Vesuvius*," says our Naples Correspondent, "hesitates to take any decided step. As at the full moon, so at the new moon there was a flare up; and those not in its secrets, as our friend Prof. Palmieri is, confidently expected a great eruption. For one or two nights before and after the new moon there was a brilliant spectacle, so far as the dense clouds on the summit would allow us to see it. But this has all ceased. Still, in that brief period the lava gurgled over and reached the edge of the old crater, over which it threatened to pass and roll down the sides of the mountain towards Somma. It is calculated that upwards of 100,000 cubic metres of lava have accumulated within the old crater. For some time yet people must dread the caprices of Vesuvius at the changes of the moon."—*Athenæum*.

The Mining Institute at Camborne has held its second annual exhibition of mining machinery, mining tools, &c. The display was of great interest, and the occasion was thought to be a fitting one for the distribution of the medals and prizes to the successful students of the science classes of the Miners' Association.

The largest Cape diamond hitherto found is the "Spalding" diamond, found in the river diggings some years since, which weighed 288½ carats. At Dutoitspan fields another large diamond has been recently found, weighing 244 carats, which is said to be free from flaw, and will cut well.

The Australian International Exhibition, 1879, is to be held in Sydney next August. The chairman of the London committee is Sir Daniel Cooper, and Mr. Edmund Johnson is the honorary secretary, their offices being 3, Castle-street, Holborn. The agent general in London has been instructed by the Colonial secretary to promote this undertaking to the utmost of his power.

The discovery of the oxide of a new metal in the Samarskite earths, is definitively announced by M. Marc Delafontaine, after an examination in which he has been engaged for the last two years. The name proposed for this metal is "Philippium," in honour of M. Philippe Plantamour, of Geneva. M. Marc Delafontaine promises in a few weeks a memoir describing the methods of preparation and purification.—*Athenæum*.

Prof. James Stuart's workshops at Cambridge now contain a valuable screw-cutting lathe by Whitworth, presented by Mr. Vansittart, of Trinity College, a planing machine formerly belonging to Prof. Willis, nine other lathes, shaping, drilling, and planing machines, and a full supply of smaller tools.

"*Slag wool*," produced, as a fine fibre of silica, by blowing steam through the slag of the iron furnaces, has been woven by Messrs. Jones, Dade, and Co. into strips and sheets. This excellent non-conducting substance can now, therefore, be very generally applied for clothing boilers or the steam conducting pipes of machinery.

The Royal Society's first meeting for the present session was held on Thursday, the 21st ult. The new Council, as proposed for election at the anniversary meeting on the 30th ult., were:—President, W. Spottiswoode, Esq.; Treasurer, J. Evans, Esq.; Secretaries, Prof. G. G. Stokes and Prof. T. H. Huxley. Foreign Secretary, Prof. A. W. Williamson; Other Members of the Council, F. A. Abel, W. Bowman, W. Carruthers, Major-General H. Clerk, W. Crookes, Sir W. R. Grove, A. G. Vernon Harcourt, Sir J. D. Hooker, Vice-Admiral Sir A. C. Key, Lieut.-General Sir H. Lefroy, Lord Lindsay, Sir J. Lubbock, Bart., Lord Rayleigh, Dr. C. W. Siemens, Dr. J. Simon, and Prof. A. Thomson.

M. Gabriel Delafosse is amongst the losses which have recently fallen on the French Academy. He died on the 13th of October. This eminent mineralogist was born at Saint-Quentin (Aisne) in 1796, was admitted to the Normal School in 1813, and he assisted Hauy in his second edition of his "Traite de Mineralogie." He was named assistant-naturalist to the museum in 1817, which office he filled, with much devotion, for twenty-four years.

The Scientific Review.

DECEMBER, 1878.

A NEW ERA IN CHEMISTRY.

WE live in a sensational age, and it seems that Science is to contribute its share of sensationalism.

It is not very many months since almost instantaneous communication of speech by the Telephone was practised before the public; and, more recently, the Electric Light has threatened to revolutionize the whole system of our modes of artificial illumination. Now we are informed that we may expect the promulgation of a discovery by which the present chemical system is to be utterly overthrown, and the sixty odd elements at present on the chemical list are to lose their character as elements, and there may be even less than the traditional four of antiquity. The eventual dissociation of the so-called elements was confidently contemplated by Faraday nearly thirty years ago, and it is not too much to say that the expectations entertained by that eminent man gave a stimulus for work in the laboratory which has never been lost by those who were privileged to be learners or fellow-labourers with him. Since Faraday's time, the whole question of the physical constitution of the universe, and especially the particular manner in which creative power may have gradually elaborated the present cosmical order of things, has been investigated with a zest, and, it may be added, with facilities for discovery, which have lent a greatly increased interest and importance to inquiries into the elementary and primal forms of matter. The apparently well-grounded belief that the heavens afford to the view of the astronomer the process of world-making in its various stages has done much of late years to encourage the particular branch of research which now seems to be yielding such extraordinary and valuable results. Mr. Lockyer believes that, in spite of the multiform aspects of the world in which we live, there is but one form of matter which is truly elementary. The primary element is presented to us in the shape of hydrogen. It is not a little remarkable that the nature of hydrogen should have been a question to which the leading French chemists have recently been devoting their energies. It is now well known, thanks to M. Pictet and his French colleagues, that hydrogen, in its gaseous form, can be, and has been, reduced to a liquid condition. Mr. Lockyer himself has arrived, by means of the spectroscope, at the conclusion that hydrogen can no longer be regarded as a simple element. Further, he believes he has proved that hydrogen is the one body of which the various metals and earths that have hitherto constituted the chemist's catalogue of elements are composed. So novel and striking an interpretation of all the phenomena of animate and inanimate nature, of all that we can see in the starry depths around us, as well as on our own globe, is difficult at first sight to entertain. That the substance we have heretofore known as a single unit in the great cosmical laboratory should be endowed with such Protean capacities of form, is a conception which utterly eclipses all that poetry or mythology have ever inspired, and the world becomes infinitely more wonderful by such revelations as now seem to be brought within our grasp. It is remarkable (says the writer of the able article in the *Daily Telegraph*, from which we quote) that the discovery which is attracting so much attention has not been made—if made at all in the particular line of investigation in which Faraday was so distinguished a worker. Mr. Lockyer is neither chemist nor a physicist. The revelation has been obtained by means of an instrument which Faraday did not live to see, and which since his day has created an entirely new department of scientific observation. The spectroscope, standing on independent ground, ultimately threatens the province of the physicist and the chemist alike; and at present it is hard to say where its claims will end. At the same time, while Mr. Lockyer's astonishing conclusion may be said to be of that exclusively optical character which the spectroscope furnishes, as distinct from that which would result from a directly chemical or physical investigation, it is right to point out that satisfactory demonstrations of the latter kind are believed to have been made during the last few months by Mr. William Crookes, if not by others as well. In this case Mr. Lockyer's grand discovery may soon be confirmed or rebutted by means of verification, which, it must be admitted, are more in vogue than the spectroscope in the average scientific world. It would be dangerous, however, to attempt to minimise the value of Mr. Lockyer's announcement by dwelling on the purely optical character of the means by which it has been arrived at. His experiments, so far as they are known, have not been restricted to spectroscopic examination of the sun and other remote celestial bodies; for it is said that the most critical and conclusive of the series have been performed upon terrestrial metals in his own laboratory. He is understood to state that pure aluminium is the only "element" he cannot at present break down into its hydrogenous combination, and, so far as analysis of a directly physical kind is concerned, he believes it is possible to dissociate most of the so-called elementary bodies by means of the common Bunsen burner.

Should it be objected that the evidence at present before the world in favour of Mr. Lockyer is too exclusively spectroscopic, the sceptical would do well to acquaint themselves with the rapid convergence of scientific precision during the last few years in the direction to which Mr. Lockyer now challenges attention. In an instructive article entitled "The Chemistry of the Future," from the pen of Mr. Crookes, in a recent number of the *Quarterly Journal of Science*, the observations by Dr. Huggins and three other eminent scientific men, peculiarly qualified to give an opinion upon a question of molecular physics, are set forth with an amount of detail that might be regarded as almost prophetic of the issue which the spectroscope is said now to have conclusively decided. Mr. Crookes's own *à priori* generalisations have themselves played an important part in that habit of scientific hypothesis which is the "life-blood of discovery." Until a few weeks have elapsed the appetite for further particulars of Mr. Lockyer's communication to the Paris Academy must remain unsatisfied. It seems quite possible that the result of the parallel investigations of a purely physical kind, which have for some time past been proceeding concurrently with those of the spectroscope, may be made known to us almost as soon as Mr. Lockyer's paper is communicated to the Royal Society. But at present the spectroscope, as the oracle which is to pronounce the fate of the "elements," is decidedly in the ascendant.

Proceedings of Societies.

ROYAL INSTITUTION.

Nov. 4th.—C. W. Siemens, Esq., V.P., in the chair.—Miss E. Forster, Hon. R. Russell, Messrs. C. T. Denton, A. W. Holmes, and F. S. Shenstone were elected members.

SOCIETY OF ENGINEERS.

Nov. 4th.—Mr. R. P. Spice, President, in the chair.—A paper, "On Harbour Bars, their Formation, and Removal," by Mr. H. F. Knapp, of New York, was read.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

Nov. 5th.—Dr. S. Birch, President, in the chair.—Mr. Cust's report of his having attended as the delegate of the society at the Oriental Congress at Florence was read; as was also the following paper, "On the Bronze Gates of Shalmaneser II., discovered by Mr. Rassam at Balawat," Part II., by Mr. T. G. Pinches.

QUEKETT MICROSCOPICAL SOCIETY.

Oct. 25th.—Prof. Huxley, President, in the chair.—Three new members were elected. Attention was called to a new catalogue of the mounted preparations in the cabinet of the society, and a vote of thanks was accorded to Mr. Hailes for its compilation. A new form of shade for microscope lamps was exhibited and described by Mr. Hailes. A paper was read by Mr. W. H. Gilbert, "On the Floral Development of *Helianthus annuus*," which he illustrated by numerous diagrams. Mr. J. J. Hunter read a paper "On the Queen Bee and her Fertilization," illustrating the subject by the exhibition of mounted preparations and living bees, and by the dissection of virgin and impregnated queens. A short discussion followed the reading of the paper.

ASTRONOMICAL SOCIETY.

Nov. 8th.—Lord Lindsay, M.P., President, in the chair.—Dr. Brühns, of the Observatory, Leipzig; Baron Dembowski, of Gallarate, Italy; Mr. G. W. Hill, of Washington; and Prof. Schönfeld, of Bonn, were elected associates. Mr. Gill read a paper "On the Progress of his Reductions in connection with his Expedition to Ascension to Observe the Opposition of Mars." He had obtained the co-operation of several Continental and American observatories in determining the position of the stars near to which the planet passed at opposition, and he exhibited a table which showed that there were discordances which amounted in some instances to as much as two-tenths of a second of time, or 3″ of arc, between the right ascensions. The Astronomer-Royal suggested that possibly a correction might be found necessary on account of the dispersion, due to the earth's atmosphere, which the light of the planet and star suffer when near to the horizon. At rising and setting the light of the star, as is well known, is stretched out into a short spectrum, with the red end lowest, and any error that arose from such dispersion would not be eliminated in comparing the observation with similar observations made on the other side of the meridian, for the dispersion would in each case operate in the same direction. Mr. Penrose showed a drawing of the corona which he had made from a station near Denver, Colorado, during the total eclipse of the 29th July last. Just after totality he had noticed several serpentine lines of light moving over the ground at a rate which he estimated to be about five miles an hour. Dr. Schuster read a paper on his observations of the same eclipse, made at Les Animas, in South Colorado. He had used a 4½ inch telescope and spectroscope, and had seen the green line at a distance of three-tenths of a diatmeter from the limb. He also saw two fainter green lines, but the eclipse terminated before he could bring the wires in the eye-piece upon them. A paper by Prof. Piazzi Smyth was read on some measures of the lines of the B group which he had made in Spain during the past summer. He described the B line itself, which is usually given as a broad black line, as breaking up into a bundle of fine lines. Mr. Ranyard read a paper "On the Presence of Particles of Iron in the Atmosphere." Mr. Murray, in examining the deep sea clays which had been brought home by the Challenger Expedition, had found them to contain many particles of native iron, which on being extracted with a magnet and examined under the microscope showed structure similar to the structure shown in meteorites. A Swedish observer had also collected particles of native iron from the clean snow which fell at a distance from towns. Mr. Ranyard in returning from America had exposed glycerine plates at the prow of the vessel when more than 1000 miles from land, and had caught a single particle of iron which was rather less than the one hundred and twentieth part of an inch in its longest diameter. He was anxious that other observers should repeat the experiment at sea, taking every precaution to keep the plates free from dust in boxes coated on the inside with glycerine. Meison read a paper "On Newcomb's Correction of Hansen's value of the Secular Acceleration of the Moon." A paper, by Mr. Burnham, was laid before the society, giving the places of 250 new double stars which he discovered with the 18½ inch refracting telescope at Chicago. A photograph presented to the society by Dr. H. Draper was also shown; and a discussion ensued as to the coincidence of the bright lines of oxygen in the photograph with bright lines or interspaces in the solar spectrum.

GEOLOGICAL SOCIETY.

Nov. 6th.—H. C. Sorby, Esq., President, in the chair.—Rev. W. Howchin, Lieut.-Col. C. A. M'Mahon, Messrs. A. Goodger, O. M. Prouse, and M. G. Stewart were elected Fellows. The following communications were read:—"On the Range of the Mammoth in Space and Time," by Prof. W. B. Dawkins; "On the Mammoth in Siberia," by Mr. H. H. Howorth; and "On the Association of Dwarf Crocodiles (*Nannouschus* and *Theriosuchus pusillus*, e. g.) with the diminutive Mammals of the Purbeck Series," by Prof. R. Owen.

ARCHÆOLOGICAL INSTITUTE.

Nov. 7th.—C. D. E. Fortnum, Esq., V.P., in the chair.—The chairman, in his remarks on the opening of the new session, spoke of the success of the meeting at Northampton, and also dwelt on the loss that archæology had sustained in the death of Mr. D. Laing, an old and valued member of the Institute. The Rev. R. S. Baker gave an account of the recent exploration of the Roman camp at Irchester, near Wellingborough. This work was commenced some weeks before the visit of the Institute to Irchester at the end of July last, and has continued up to the present time. A complete *oppidum* has been uncovered, and large quantities of antiquities, among them the most noticeable being numerous weapons and implements of iron, and human hair from interments. Mr. S. Bayly sent a large flint cent and a collection of Roman coins, and medals of later date, found at Billericay. Mr. Ready contributed a collection of late Roman rings, found in London, and a massive silver ring of the time of Henry the Third. Sir J. Maclean exhibited a rubbing of an Arabic inscription from Cyprus. Mr. Hartshorne sent a MS. catalogue of the library of Lund church.

LINNEAN SOCIETY.

Nov. 7th.—Prof. Allman, President, in the chair.—The Rev. W. W. Fowler and Messrs. W. Huddleston and T. M. Shuttleworth were elected Fellows. Sir J. Hooker, C.B., presented to the society in the name of a committee of gentlemen a portrait in oil, by Mr. Peale, artist, of the Rev. M. A. Berkeley, the distinguished fungologist. Mr. T. Christy called attention to living specimens of West African India Rubber Tree, the *Urostigma Vogelii* and another undetermined species, recently arrived. Dr. M. Masters read an extract from a letter of Dr. Beccari, describing a gigantic Aroid found by him in Sumatra, side by side with the *Rafflesia arnolii*. The species has a large tuber five feet round, from which is pushed up a single leaf with a long stout petiole, the divided blade covering an area of 45 feet or 15 mètres. Dr. R. C. A. Prior showed a specimen of *Colletia cruciata* in bloom, grown out of doors in Somersetshire by the Rev. W. Sotheby. "Notes on Euphorbiaceæ," by Mr. G. Bentham, read in title, was a paper treating of the history, nomenclature, systematic arrangement, and the origin and geographical distribution of this order of plants. Among Dicotyledons, Euphorbiaceæ stand forth in point of numbers, possessing as they do above 3,000 species and 200 genera. In investigating the origin of the order the geological record unfortunately is of no assistance. Their evident generally tropical nature is a striking feature, and, judging from various data, it is conjectured that their most ancient home was in the old world. Their affinities have repeatedly been discussed by botanists; but though there are individual genera which may exhibit some one character supposed to ally them to other orders, yet no real connection has hitherto been pointed out. Their isolation is produced not so much by any one special character, as by a special combination of several. As to position in the linear series, unless the order be broken up, practically it must remain among the Monochlamydeæ, in spite of occasional presence of corolla in some forms. The author has a most interesting chapter on nomenclature and synonymy, well worthy the study and serious attention of biologists generally. Mr. L. A. Bernays, in a letter to the secretary, records the undoubted existence of *Carpesium cernuum*, Willd., in Queensland, and suggests its being indigenous. In "Descriptions of New Hemiptera," Dr. F. B. White gives details of two new genera and seventeen new species from the country bordering the river Amazon, chiefly obtained in Prof. Trail's late exploration of that region. "Notes on Cleistogamic Flowers, chiefly of Viola, Oxalis, and Impatiens," was a paper read by Mr. W. A. Bennett. The Rev. G. Onslow orally delivered the gist of a paper "On the Absorption of Dew and Rain by the Green Parts of Plants."

GEOGRAPHICAL SOCIETY.

Nov. 11th.—Opening meeting (held in the theatre of the University of London), Sir Rutherford Alcock in the chair. — The President, after the formal business of electing new members and recording the names of candidates for election had been disposed of, expressed his regret that he had almost at the last moment received a letter from Lord Dufferin, stating that, owing to his having received the Queen's commands to attend Her Majesty at Balmoral, it was out of his power to take the chair at the opening meeting and to deliver the inaugural address. In these circumstances he (the president) was requested not only to preside, but to speak to them as to the progress made by geographers during the last year. What he had to say would, in the circumstances, be brief, and, labouring as he was himself under slight indisposition, he would ask their secretary, Mr. Bates, to read what he had written on the subject. Mr. Bates then read the inaugural address, in which the

President said,—The inability of Lord Dufferin to attend this opening of the session was made known to me only a few days ago, allowing very insufficient time to prepare any elaborate or studied address. But, in truth, a work of this kind on the opening of the session is not necessary. It is not retrospective, but anticipatory, and originally the preliminary observations of the President were intended only as a brief announcement of the Fellows of the prospects of the new session, the papers in hand or expected, together with a passing reference to the latest news of any expeditions in which the society was interested. Any detailed review of geographical progres and events, if not wholly out of place on such an occasion, is undesirable, as it would tend to limit the scope of the annual address delivered at the anniversary meeting, held towards the close of the session, in May, in which a careful retrospect of the progress of geography and the leading events forms the principal subject. The task of reviewing the progress of exploration on this occasion, however, would in any case have been a light one, inasmuch as few events of much interest have transpired since the society last met. We have no grand African discoveries to announce or comment upon, no Cameron or Stanley being at present in the field. The only salient news from Africa that has lately been received is, unfortunately, of obstacles and misfortunes happening to expeditions now on their way to the interior. I allude more especially to the important expedition equipped and directed by the International Commission, under the auspices of His Majesty the King of the Belgians. This expedition, having received a reinforcement of two officers—MM. Wautier and Detrieux—sent to replace the two who died at Zanzibar, started for the interior on 28th of June last, forming a caravan of 408 men. They had reached a point a little beyond Mvomero, only 100 miles or thereabouts from the coast, on the 22nd of July, when the Wanyamwesi porters mutinied, and finally abandoned the party, taking with them the greater part of the stores and goods with which they had been intrusted. Happily, no blood was shed, and M. Cambier, the leader, was able some days afterwards to reach Mpwapwa, where the Church Missionary Society have established a station, and organise measures for the future advance of the expedition. Although there are no geographical achievements like those of last year to record on the part of the emissaries of the great missionary societies in the African interior, it may be mentioned that progress is steadily, if not rapidly, being made in various quarters. The Rev. C. T. Wilson, who returned to King Mtesa's early in the year, has recently reported that the reinforcement for the Uganda Mission sent from England, by way of the Nile, after the deaths of Lieutenant Shergold Smith and Mr. O'Neill, left Khartoum in August, and were expected to arrive at King Mtesa's in October. Other missionaries were on the way to Victoria Nyanza from the direction of Zanzibar. Mr. Mackay, who had travelled by the Unyanyembe route, was reported as having reached a point not many days' journey from the lake on the 4th of June, and Messrs. Stokes and Copplestone had left Mpwapwa for the same destination on the 19th of August. The party sent to Lake Tanganyika by the London Missionary Society are also making steady progress. After the loss of their draught cattle on the road to Mpwaywa, some time was necessarily lost in the re-organization of the expedition on the ordinary system—by the hiring of a large body of native carriers; but the caravan had now reached the capital of King Mirambo, and an advance party had pushed forward to Ujiji, which place they expected to reach in September last. One of the objects of this mission, as you are doubtless aware, is to establish a station at the southern extremity of the lake and thus approach the establishments of the Scottish Free Church Society on Lake Nyassa, with which it is hoped eventually to open up a line of communication. I am informed that no time will be lost, on the arrival of the first party at Ujiji, in despatching members of the mission by boat to the southern end of the lake, which it is thought probable will be reached in January next. Of other expeditions in progress nothing of importance has been recorded since the publication of my anniversary address in May last. I ought, however, to mention that the German Geographical Society, in addition to the expedition to Central Western Africa mentioned in my address, has since sent out another explorer, the well-known traveller, Gerhard Rolphs, with the object of crossing Central Africa from north to south. Herr Rolphs intends to make first for the neighbourhood of Lake Chad, starting from Tripoli, and, having reached this point, to make it the basis of a fresh start across the great blank which lies on our maps between Lake Chad and the middle course of the Congo. The expedition to the northern end of Lake Nyassa, and thence to the southern end of Lake Tanganyika, determined upon at the June meeting of the subscribers to the African Exploration Fund, has now completed its preparations, and will leave England in a few days for Zanzibar. As you are aware, the leader chosen by the committee is Mr. Keith Johnston, well qualified by his acquirements as a scientific geographer to carry out the objects of the expedition, which are to obtain an exact knowledge of the still unexplored region lying between the recently-constructed road near Dar-es-Salaam, south of Zanzibar, and the lakes just mentioned. He has chosen for his assistant and second in command, Mr. Joseph Thomson, a young geologist, well recommended by Professor Geikie, of Edinburgh, and we feel entire confidence that should they maintain their health and meet with no insuperable obstacles, a large amount of accurate and valuable information regarding the country, its products and resources, the best routes to the lakes, and the hydrology and geology of the lake districts, will be the result of this undertaking. In other parts of the world there is but little calling for remark, except the brilliant achievement, of which you have all heard, of the Swedish Arctic Expedition under Professor Nordenskiöld. In my anniversary address I entered into some detail regarding the equipment and objects of this bold undertaking, which aimed at nothing less than the solution of the historic problem of a north-east passage, from Western Europe to Behring Straits. We have now learnt that the most difficult part of the task has been accomplished, the expedition having safely rounded Cape Cheljuskin (lat. 77 32 N.), the most northerly point of Asia, and passed the mouth of the Lena. A telegram conveying this important intelligence reached Mr. Dickson, of Gottenburg, the generous patron of the undertaking, on the 17th of October, from Irkutsk, having been conveyed thither from the mouth of the Lena, first by a small steamer up the river to Yakutsk and thence by Russian post to Irkutsk, the nearest station on the Siberian telegraph line, distant about 2,400 miles from the anchorage of the Swedish exploring vessel. A distance of 1,100 miles remained still to be accomplished before the expedition reached Behring Straits, but the whole of it has previously been navigated, and Professor Nordenskiöld had full confidence in his ultimate success, and had even requested letters to be addressed to him at Yokohama. A paper on the subject of this remarkable voyage, together with another on the Dutch Arctic Expedition of last summer, by Mr. Markham, will be read at the meeting of December 9, when our new President, Lord Dufferin, it is expected, will take the chair. I take this opportunity of announcing that the Council have for some time had under their consideration and have this day adopted a scheme for improving the "Proceedings" published by the Society by the insertion of geographical notices, maps, and other matter of general interest derived from various sources independent of the Society, and by increasing the frequency of the issue, making it, in short, a monthly publication. This change will add to the expense of the publication considerably, but not more, it is hoped, than will be compensated by the increased value and attractiveness of the publication to the Fellows of the Society (who will receive the numbers free by post as heretofore), and to the geographical public generally, and thus contributing to the diffusion of geographical knowledge over a wider area. The programme of lectures on the scientific branches of geography agreed upon for the present session is as follows:—At an early meeting after Christmas, Professor A. Geikie, of Edinburgh, will deliver a lecture on "Geographical Evolution." At a meeting, not yet definitely fixed, before or after Easter, Mr. J. Ball, F.R.S., will address us on the subject of "the Flora of the European Alps, and its Connection with that of other Regions of the Earth." The concluding lecture will be delivered in May, by Professor Rolleston, on "the Modifications of the External Aspects of Organic Nature produced by Man's Interference." A paper by Mr. L. M. D'Albertis, on "A Journey up the Fly River," was then read by Mr. Clements Markham, after which the meeting terminated with the usual vote of thanks. The following gentlemen were elected Fellows:—Sir S. Freeling, Rev. C. L. Acland, Messrs. A. O. Lefroy, W. Scott, G. Smith, and J. H. Ward.

ZOOLOGICAL SOCIETY.

Nov. 5th.—A. Grote, Esq., V.P., in the chair.—The Secretary read a report on the additions to the Menagerie from June 1st to October 31st. Letters and communications were read from Mr. J. H. Gurney, containing a memorandum from the late Mr. E. C. Buxton, stating that *Austurinula monogrammica*, observed on the eastern coast of Africa, had a song which was heard morning and evening,—from Dr. A. B. Meyer, respecting a supposed new Bird of Paradise, from the west coast of New Guinea,—from a letter by Mr. A. H. Everett, stating that Anoa of Celebes (*Anoa deyressicorms*), or an allied species, was found in the Island of Mindoro, Philippines, —by Prof. Newton, on a supposed hybrid between the Red Grouse and Ptarmigan, lately shot in Sutherland,—from Mr. R. B. Sharpe, on a new species of Indicator, and on *Pæoptera lugubris*,—from Mr. G. B. Sowerby, jun., on ten new species of Shells from various localities,—by Mr. A. G. Butler, on a new Spider, obtained in Madagascar, for which the name of *Cœrostrii avernalis* was proposed, —from Lieut.-Col. R. H. Beddome, on six supposed new species of Snakes of the genus Silybura, family Uropeltidæ, from India,—from Mr. E. A. Smith, on a collection of Marine Shells, made by Capt. L. W. Wilmer in the Andaman Islands,—by Mr. F. Moore, on the Lepidopterous Insects collected by Mr. O. Limborg, in Upper Tenasserim,—by Mr. G. F. Angas, on six species of Bilvalve Shells in the collection of Mr. Sylvanus Hanley, F.L.S., and a Helix from the Solomon Islands,—by Mr. Angas, on ten species of Marine Shells from South Australia, and on Marine Mollusca to be included in the Fauna of South Australia,—by Dr. G. E. Dobson, on *Myxopodo aurita*, a new form of Chiroptera from Madagascar, and on some new or rare species of Bats based on specimens in the Museum of Natural History of Paris.

CHEMICAL SOCIETY.

Nov. 7th.—Dr. Gladstone, President in the chair.—The following papers were read:—

"Contributions from the Laboratory of Tokio, Japan: on the Red Colouring of the *Lithospermum evythrorhizon*," by Mr. M. Kubara. — "A Second Report on some Points in Chemical Dynamics," by Messrs. C. R. A. Wright and A. P. Luff. The authors have continued their previous research, and have determined the temperature of initial action of carbonic oxide, hydrogen, and carbon on various oxides of iron, manganese, lead, cobalt, and nickel. They find that the general law holds good that the temperature of the action of carbonic oxide lies below that of hydrogen, which again is below that of carbon. This rule appears to be a special case governed by the general law that, *cæteris paribus*, the greater algebraically is the heat evolution taking place during a reducing action on a metallic oxide, the lower is the temperature at which the action is first noticeable during a few minutes' action.—"Note on the Constitution of the Olefine produced by the action of Zinc upon Ethylic Iodide," by Dr. Frankland and Mr. Dobbin. The gas given off was passed through alcohol and sulphuric acid, and then absorbed by antimonic chloride. On treating with water and distilling, a chloride was obtained, boiling at 33° C.; it was, therefore, ethylenic and not ethylidenic chloride.—"On the Occurrence of certain Nitrogen Acids amongst the Products of the Combustion of Coal-gas and Hydrogen Flames," by Mr. L. T. Wright. The author proves that the origin of the nitrogen acids found in the condensed water procured by burning coal-gas or hydrogen in the air is ammonia, either free or combined, no such acids being produced when the gases are carefully freed from ammonia.—"On the Action of Bromine upon Sulphur," by Mr. J. B. Hannay.—"Researches on Dyeing, Part I., Silk and Rosanilin," by Dr. Mills and Mr. G. Thomson.—"Comparison of the Actions of Hypochlorites and Hypobromites on some Nitrogen Compounds," by Mr. H. J. H. Fenton. The compounds selected were ammonium, carbamate, guanidine, and biuret.—"Notes on Two New Vegeto-alkaloids," by Messrs. F. von Müller and L. Rummel.—"On the Determination of Lithia by Phosphate of Soda," by Mr. C. Rammelsberg.

INSTITUTION OF CIVIL ENGINEERS.

Nov. 12th.—Mr. W. P. Barlow, V.P., in chair.—The following papers were read:—"On the Avonmouth Dock," by Mr. J. B. Mackenzie,—"On the River Lagan and Harbour of Belfast," by Mr. T. R. Salmond, and "On the Whitehaven Harbour and Dock Works, by Mr. J. E. Williams.

NEW SHAKSPERE.

Nov. 8th.—Mr. Furnivall, Director, in the chair.—After a statement that eight new members had joined the Society, and that Mr. T. A. Spalding, LL.B., had become Treasurer, a paper, by Mr. P. A. Daniel, was read, "On the Times or Duration of the Action of Shakspeare's Plays, Part I., the Comedies." Taking these in the order of the folio, Mr. Daniel pointed out how many days, and what intervals between them, there were in each comedy. He brought out the many inconsistencies of time in these plays, but considered that the confusion in the "Merry Wives" was due to some manager compressing two of Shakspeare's scenes into one. In "As You Like It" two scenes were entirely out of place in the order of time, as others were in "Lear" and "Antony and Cleopatra."

PHYSICAL SOCIETY.

Nov. 9th.—Prof. G. C. Foster, V.P., and afterwards Prof. W. G. Adams, President, in the chair.—Sir F. Elliott was elected a member.—Prof. W. G. Adams explained a simple appliance, made by Mr. S. C. Tisley, for exhibiting the coloured bands due to interference with thick plates.—Prof. W. F. Barrett exhibited and explained Edison's Microtasimeter and Carbon Telephone.—Mr. Ladd showed several forms of Electric Lamp, arranged so as to render the use of clockwork unnecessary.

PSYCHOLOGY.

On the 7th November, the President of the Psychological Society of Great Britain delivered his sessional address on the claims of Psychology to a place in the circle of the scienes. The subject of life and soul has for some time occupied the attention of thoughtful men and earnest seekers of the truth, but whether it can ever be recognised as a science is still a divided opinion—at present, at least, it is refused admission by the British Association for the Advancement of Science. That there are evidences in proof of the existence of the soul beyond the *generally accepted belief* is without dispute, for the *bonâ fides* of many who have witnessed them cannot be questioned. The *circles* formed through the mediumship of Mr. Duguid, of Glasgow, have been visited by hundreds of people, and to say that all were the subjects of some ocular delusion is as absurd as it is unphilosophical. The most superficial acquaintance with the writings of Allan Kardec, Anna Blackwell, or any literature now extant in reference to this matter, should at least suffice to prove that a subject so vastly progressing must, at least, have something more tangible than theories for its basis. The more recent records of experience form a great field for further investigation, and is worth some human effort for confirmatory evidence. The nature and capacities of the mind, and its relationship to the body with its future, especially in these days of materialism, should now, more than ever, win the attention of thoughtful men.

Our space will not permit us to give the whole of the address, but we extract the following, which form the chief features:—

"The definition of Psychology adopted by this Society is perfect. It expresses precisely, clearly, emphatically, and truly what is designed by its title. My purpose this evening is to set forth the subjects for research and discussion that are properly embraced by that definition. Psychology is the science that investigates the forces by which the mechanism of man is moved and directed. It is essentially distinct from biology, or the science of life with which it is often confused by materialists. Intelligent motion is not in any manner associated with the motions that indicate the presence of life. The province of biology is to trace the difference between the things that have life, and the things that have not life; to determine the points of difference, and the laws that regulate the beginning, the progress, and the end of life; to solve if it can, the problem whence life comes, and what it is. The range of biology is sufficiently large and perfectly definite, but by no stretch of definition could it be made to include Psychology."

"Mark how wide a range there is for investigation and deduction by Psychology, and then say if it has not a title to be a science—and a very noble science."

At its foundation is life. What is life? What marks the distinction between the living thing and the thing that has no life? Are they specially different, or do they pass one into the other? According to the Darwinian theory of evolution, when did life begin, and how was it evolved? Or is the universe a huge living whole, its parts taking the various forms of life according to the conditions under which the development occurs? In man what is the beginning of life? What are its functions? What relationship has it to the other forces that control the mechanism? From what source is the vital force fed, why does it fail, and how does it cease?"

"Then for mind. What do we intend by the term? Is mind identical with soul? Is it distinct from soul? Is it an entity? Or is it, as I venture to contend, the collective name given to the actions by which the soul expresses itself upon the external world through the mechanism of brain and nerve system."

"What is *the thing* that is conscious of the molecular action that by no stretch of imagination can be conceived to be conscious of itself. This is the true battle field between Materialism and Psychology, and here the main fight must be fought. Psychology says we see in this consciousness the existence of something that is conscious—conscious of itself—conscious of the external world, whatever irregularity attends the action of the molecular mechanism.

This *something* that is not the body, Psychology supposes to be an entity, and that entity is the true man. We call it soul for lack of a better name, but we attach to this name no foregone conclusions of its structure, its facilities, its capacities—nor even of necessity for existence after the dissolution of the body. At this point we affirm only that the thing we call soul exists—but what it is, what it does, what it can do, where it is at present, what it is to be in the future, are questions for Psychology to answer, as they can only be satisfactorily answered by extensive and accurate observation of Psychic phenomena."

"We have a multitude of phenomena that have been called Psychic by those who object to a name that embodies a 'foregone conclusion,' preferring to wait the result of larger experience and more accurate experiment before they venture dogmatically to assert the source of these phenomena. This caution is the more necessary as undoubtedly the conditions requisite for the production of the phenomena are such as almost to tempt to fraud."

The growing interest in this great question is proved by the excellent audience gathered at this meeting. The address was admirably given by the President, and listened to with marked attention, a vote of thanks being voted at the close.

THE ELECTRIC LIGHT.

The Jablochkoff system has recently been tried at the tobacco factory of Messrs. Cope Brothers and Co., Liverpool, in the presence of a large number of persons interested in the experiments. A strong light is required in the process of cigar making, and each worker has a separate gas jet. In consequence of the workpeople being crowded together and of the immense number of gas jets burning in the room, the atmosphere becomes vitiated and the temperature excessively high—defects which no method of ventilation has sufficed to obviate. Three of Jablochkoff's "candles," set up on tripods, proved adequate to the lighting of a large room in which several hundred women were at work. The illumination from these lamps, enclosed in the usual opalescent globes, was fully equal in brilliancy to the light of a multitude of gas jets, and it had this additional quality, that the infinite variety of shades in the tobacco leaf were as easily discernible as in the natural sunlight. Another marked advantage was found in the greater coolness and purity of the atmosphere, which was not vitiated by the heat inseparable from gas, and work could consequently be pursued with greater comfort and efficiency. The experiments also showed that the electric current could be subdivided indefinitely, as half-a-dozen "lamps" were kept steadily burning in different parts of the factory, all supplied from a single Gramme generator worked at a speed of 800 revolutions per minute from the ordinary steam engine on the premises.

INTERNATIONAL PATENT LAW CONGRESS.

THE inaugural séance took place on the 5th September, at Paris, under the presidency of M. Teisserenc de Bort, Minister of Agriculture and Commerce, one of the hon. presidents of the Congress, who was supported by Herr von Chlumetzky, Austrian Minister of Commerce and Public Works.

Amongst other remarks by the President in regard to the extent of an inventor's right, was this—Was his invention merely the appropriation of a common fund of ideas or knowledge which is free to all, or should it be regarded as an absolute property similar to complete, exclusive, and perpetual possessions? As this question had long been discussed without any solution being arrived at, it sufficed to inquire whether it was advantageous to the community to grant a monopoly, limited in its duration, to the author or importer of an invention. Most countries had practically answered this in the affirmative by protecting invention; and it must be owned that the absence of protection discouraged experiments on the part of the inventor, who feared imitators; it encouraged secret working, to the great detriment of general progress; and it also had the effect of inducing the inventor to desert his own country for one more favourable to the development of his creations. These considerations appeared to have decided the question; but after recognising the advisability of protecting the right to invention there were two great interests to be reconciled. On the one hand, the inventor must be ensured the enjoyment of ownership of what he had created; and, on the other, society should not be deprived, after a certain length of time, of the free use of a discovery which was an element of progress, so that the march of invention might not be seriously injured. Three different modes had been sought of reconciling these two interests. In some countries the application was submitted to a preliminary examination, and was only granted on the utility of the invention being established; elsewhere the patent was granted at the risk of the inventor, without guarantee either of the merit of the invention or its accuracy of description; and, according to another system, the patent was only granted after previous publication to enable those interested to dispute the novelty. This diversity of procedure proved that the principles of a sound legislation as to patents had yet to be determined; and this also applied to industrial designs and trade marks. This diversity was also a source of great difficulty and expense to inventors; indeed, uniformity had become a pressing necessity. This had been recognised since 1873, when the Congress at Vienna during the Exhibition was the first step in this direction. M. Teisserenc de Bort concluded his address with the assurance that his department of the Government would attentively follow the deliberations of the Congress, which would be a great assistance in the discussion of the proposition of M. Bozérian, which he hoped would bring about a great improvement in the French law on this question.

MM. Barrault, Lyon-Caen, Bozérian, and De Maillard de Marafy then formally put in the reports of their various sections, viz., patents (two reports), designs, and trade marks. The final bureau of the Congress was then constituted as follows:—Hon. Presidents, M. Teisserenc de Bort, minister of agriculture and commerce; Herr von Chlumetzky, Austrian minister of commerce and public works; and Dr. C. W. Siemens, President of the Patent Congress at Vienna in 1873. President, M. Bozérian, senator. Vice-presidents, M. Tranchant, councillor of State; M. Dumoustier de Frédilly, director of internal commerce at the French ministry of agriculture and commerce; M. Meurand, director of consulates; M. Barbedienne, manufacturer of bronzes; M. Bodenheimer, deputy to the Swiss Federal Council; Herr Hegedüs, member of the Hungarian Parliament; Herr Klostermann, privy councillor at Berlin; Herr Mullendorff, grand ducal councillor, Luxemburg; M. de Nebolsine, Russian councillor of State; Mr. Pollok, civil engineer, Washington; Herr Rouleaux, privy councillor at Berlin; Herr von Rosas, councillor of finance, Austria; Admiral Selwyn, Vice-President of the Inventors' Institute, England; Herr Stoltz, civil engineer, Norway; and Signor Torrigiani, member of the Italian Parliament. General Secretary, M. Ch. Thirion, engineer, Paris. Secretaries, M. Clunet. advocate at the Paris Court of Appeal; M. Albert Grodet, secrétaire du comité du contentieux de l'Exposition; M. Ambroise Rendu, doctor of law, advocate at the Court of Appeal; Mr. Alexander, barrister, London; M. Biebuyck, advocate, Brussels; M. Kaupe, engineer, St. Petersburg; Herr Carl Pieper, civil engineer, Dresden; and Dr. Schmidt, of Vienna.

GENERAL QUESTIONS.

On the following day, under the presidency of M. Bozérian, the discussion turned upon the general consideration of the nature of the inventor's right, which formed the subject of Question No. 1, "The right of inventors to their works, or of manufacturers to their trade marks, is a right of ownership founded on the natural law; the civil law does not create it, but only subjects it to regulation."

M. Dupray de la Maherie contended that that this ownership was one of common right, as regarded from the triple point of view of history, philosophy, and experience.

Admiral Selwyn saw no difference between the painter and the inventor as regards the right of ownership in their several productions. It was not true that a man was not an inventor if he had not perfected his invention. The Americans, an eminently practical people, had appointed a preliminary examination of patents, which had given beneficial results; for instance, while England registered 3000 patents in the year, America had registered 15,000. If the inventor has a right of ownership recognised by every nation, the public had rights not less important, which should serve as a starting point for fixing those which it might be found advisable to grant inventors.

Mr. Droz considered that it was of less consequence to seek whence the right proceeded than to know what it was in actual legislation. It was an ownership of special nature, but at the same time one of common right.

M. Limousin considered inventions the result of labour, and, therefore, based upon the principle of ownership as defined by political economy.

Mr. Lloyd Wise felt some difficulty in accepting the proposition, although he agreed in wishing to give all possible protection to authors, inventors, and others. An inventor had the right to his invention only so long as he kept it to himself; but the object of protection was to allow the inventor to "bring his invention out;" and it was very desirable that this should be done as quickly as possible. Sometimes nearly the same idea occurred to more than one individual at about the same time; and sometimes men made inventions and kept them secret. He who first took active steps with a view to introducing his invention was the one who conferred benefit on the public, and who ought (in the absence of fraud) to be rewarded. Assuming the proposition before the meeting to be adopted, it would, on that theory, be impossible ever to decide whether a patentee was the rightful holder of the right to an invention, as a prior inventor might at any time appear and lay claim to it. In his opinion it could not be said an inventor had any exclusive right to his invention (once disclosed) except such as the law expressly gave, and the contrary proposition under discussion would, in his belief, be regarded, at least in England, as altogether unpractical.

M. Lyon-Caen thought that the Congress would do well, at the commencement of its labours, to affirm purely and simply the right of the inventor to the law's protection, without entering into any theoretical discussion of his right.

M. Pouillet, however, argued against this amendment; he thought that as the theoretical question of the right had been posed by the Congress, it should also be settled.

M. Demeur, of Brussels, took the opposite side. The Congress considered it well to pronounce an opinion on the question of principle; and he opposed the counter proposition of M. Schreyer, of Geneva, couched in these terms:—"The right of inventors is a useful and equitable provision of civil law which has reconciled the rights of the inventor and the public by the granting of a temporary monopoly," and supported Question 1, as given above, with the omission, however, of these words, "founded on natural law."

After further discussion, the original proposition, with this amendment, was carried.

Proposition No. 2, "Foreigners should be assimilated to natives," was proposed by M. Clunet.

M. Imer-Schneider, delegate of the Swiss Confederation, read a declaration made by his Government, to the effect that reciprocity should be required in this matter, a view which was supported by M. Lyon-Caen.

After further discussion, the proposition was adopted by the Congress.

On Saturday, 7th, the discussion of general questions was continued.

M. Albert Grodet proposed the following resolution: — "Stipulations of reciprocal guarantee as to industrial ownership should form the subject of special conventions independent of treaties of commerce, and also of conventions as to literary and artistic ownership."

This was supported by M. Lyon-Caen, who added, however, that these special treaties should not be of indefinite duration; and the proposition was subsequently adopted.

M. A. Grodet also brought forward and enlarged upon the following:—A special department of 'industrial ownership' should be established in every country, to which should be attached a central depot of trade marks and manufacturing designs for reference by the public. Independently of any other publication, a periodical official journal should be published for their service."

Admiral Selwyn, recalling the example of the United States, observed that to require the deposit of models would unnecessarily encumber the central office, and that photographs would be quite sufficient.

M. Maillard de Marafy explained that the proposition intended that only documents should be kept. The French central administration was not able to carry out the law on account of the depots being so scattered. A central depot was absolutely necessary for properly conducting the business of the departments.

Mr. Lloyd Wise supported the proposition of M. Grodet. Before the American Patent-office commenced publishing the *Official Gazette*, he had proposed to Mr. Woodcroft, of the English Patent-office, that reports of Patent-law cases should be given in the Commissioners of Patents' journal. The United States *Official Gazette* was a publication such as he would wish to see in England and other countries, where the protection of inventions and designs exists. He also argued that there should be a central office in each country for all patent business. To a certain extent the English Patent-office might be said to be a central office. Some time ago, the business of the registration of designs, which had previously been transacted at a separate office, was transferred to he Patent-office, and the registration of trade marks was also connected with it, The Society of Arts, which, as he need scarcely say, was an influential society. numbering about 4,000 members, had taken great interest in the reform of the law relating to patents and trade marks, and at a meeting held last year to consider the Patent Bill introduced by the Attorney-General, had passed a resolution to the effect that the requirements of the Patent-office should be properly provided for, and a suitable museum and public library maintained, before the funds, derivable from stamp fees, were used for the general purposes of the State. He would not advocate the compulsory deposit of models, which was very hard on the inventor; though some models of imtportant inventions might be constructed a the cost of the State, and preserved as a record of progress.

The resolution was adopted; and the Congress then considered the next proposition. "It is advisable to grant a provisional protection to patentable inventions, to industrial designs and models, as well as trade marks entered at international exhibitions; which was affirmed, as also the next, "The provisional protection accorded to inventors who take part in the above-named international exhibitions should be extended to all countries represented thereat."

The following propositions were also adopted:—"The fact of an article being shown at an international exhibition should not form an obstacle to its being seized if proved an infringement." "Each of the branches of industrial ownership (*propriété industrielle*) should form the subject of a special and complete law." "It is desirable that as regards industrial ownership the same legislation should be in force in a State, its colonies, and the various parts of the same State. It is also desirable that the conventions of reciprocal guarantee of 'industrial ownership,' concluded between two countries, be applicable to their respective colonies."

PATENTS FOR INVENTIONS.

On 9th September, the Congress proceeded to the discussion of the following proposition:—"All inventions, all processes, or products, are patentable except combinations or plans of finance and credit, or inventions contrary to public order and morality."

A discussion ensued as to the patentability of chemical products. The speakers included M. Poirrier, M. Schreyer, M. Lyon-Caen, Mr. Pollok, and M. Pouillet.

The Congress decided that patents should be granted "for chemical and alimentary products;" and the discussion was continued on the patentability of pharmaceutical products by M. Terguetil, M. Lecocq, M. Genevoix, and M. Barrault.

It was then decided by forty-six votes against thirty-eight that patents should be granted to inventors of pharmaceutical products;" and the Congress passed on to the discussion of the question as to whether patents should be granted "after or without previous examination."

M. Barrault pointed out the importance of this question. In the United States a preliminary examination had been in force for eighty years. In 1877, 23,000 patents were applied for, and 17,000 granted. A preliminary examination had become impossible; and patents had been granted for inventions patented thirty years before. Besides, notwithstanding the enormous expenses of the Patent-office, the examination was deprived of all degree of certainty. In France the preliminary examination had not been adopted; at the end of a year half the patents were no longer in force. Consequently, without any possible error of the administration, the public gained 50 per cent. of the patents. In England, at the end of the seventh year, no more than 7 per cent. of the patents remained in force. The preliminnry examination was not, therefore necessary, since a better result was arrived a without any difficulty.

Herr Klostermann, of Berlin, proposed the following amendment:—"Petitions for patents should be subjected to a preliminary examination, which cannot involve the rejection of the petition by the examiners; but the right of opposition should be granted to the Government as well as to the public, by means of sufficient publicity. Objections formulated in the terms fixed by the law shall be determined by the courts."

Herr Carl Pieper, of Dresden, considered the principle of preliminary examination excellent; and the countries adopting it would have better inventors than those under other regulations. He added that the French members of the Congress attached too much importance to a law made for France.

M. Pouillet opposed the preliminary examination on the ground that examiners could not be obtained. The experience of the United States was not in favour of this system, which had led to abuses; and the German law was of too recent a date to allow of conclusions being drawn from its working. It was not the case that, when there is a previous examination, the patent attracts capital. The United States patent was granted at the risk of the inventors; and those interested could oppose it. The only practical result of the preliminary examination was to weed out useless patents; but experience proved that this took place of itself in countries where there is no previous examination.

M. Leboyer contended that the preliminary examination was a natural consequence of the vote by which the Congress declared that the patent was a "right of ownership" (*droit de propri té*), and was of opinion that if there were no preliminary examinations it was better not to grant patents at all.

M. Charles Lyon-Caen said that the petitions for patents should be published in such a manner as to inform all interested in the matter. Within a space of time to be fixed opposition might be made to granting the petition. If there were no opposition the patent would be granted; but, if there were opposition, a law-suit would ensue between the petitioner and the opposer. The judge would refuse or grant the patent, and his decision would be final.

M. Leon Lyon-Caen opposed the preliminary examination. In France, those interested had the power of attacking patents already granted, but this power was hardly ever exercised, and it would be the same for the *procédure provocataire* if adopted. Opposition would often be made merely by way of advertisement. Lastly, the courts would not be competent to appreciate inventions not yet worked.

Mr. Alexander, of London, would not admit the system of *procédure provocataire* proposed by M. Lyon-Caen, but, with this exception, he pronounced in favour of the preliminary examination. In connection with this subject, he referred to the decisions of the Association for the Reform and Codification of the Law of Nations. In his opinion, a preliminary examination was necessary, in the interests of inventors. He added that, if examiners were sometimes bought, this should not be laid to the charge of the preliminary examination.

On the following day the discussion was continued. Herr Schmidt, of Vienna, remarked that preliminary examinations existed in the United States and throughout Europe, except France, Belgium, and Italy.

The Count de Douhet, senator, desired that when an inventor deposited his petition it should be examined by a competent committee, who should give the patentee an opinion on his invention; and the inventor could make what use he pleased of this opinion.

MM. Bodenheimer and Imer, delegates of Switzerland, made the following proposition:—"Patents shall only be registered after publication. In case of opposition they shall be subjected to a preliminary examination bearing upon the degree of novelty of the invention. This examination shall be made by a body, the decisions of which shall be subject to appeal before a superior court."

M. Barrault again pointed out the difficulties of the preliminary examination, the impossibility of seeking for priority in the 500,000 patents existing in the various countries of the world.

Herr von Rosas, speaking in the name of the Society of Engineers, and of the Industrial Society of Vienna, supported the proposition of M. Bodenheimer. He demanded of the Congress to vote a resolution which should serve as basis for an international understanding.

The proposition was, however, rejected.

MM. Reuleaux, of Berlin, Poirrier, and several members, proposed the following:—"Petitions for patents should be subjected to a preliminary examination, which shall not lead to the rejection of the petition by the examiners; but the right of opposition should be granted both to the Government and to the public by means of suitable publicity. Opposition made in the terms fixed by the low shall be judged by the Courts." (Rejected.)

MM. Lloyd Wise, Reuleaux, Thirion, general secretary, and Perisse, proposed the following resolution:—"A patent should be granted to every applicant at his own risk and peril. It is, however, advisable that the petitioner should receive a preliminary opinion on the question of novelty, so that he may, at his discretion, maintain, modify, or abandon his claim.

M. Droz remarked that there were seven or eight special methods of preliminary examination before the meeting, and that there was, consequently, but one way of arriving at a conclusion, viz., to reject the preliminary examination altogether. Referring to the proposition, he thought that the opinion given by the Government would be a cause of difference between it and the courts.

M. Schreyer, Swiss delegate, called upon the Congress to vote the resolution relative to the opinion to be given to inventors, and spoke very strongly in favour of the resolution proposed by Mr. Lloyd Wise and others.

M. Couhin called the attention of the Congress to the true character of the resolution, and explained how it constituted a compromise between the system of preliminary examination and that of non-examination.

M. Pouillet was in favour of the proposition, at the same time observing that the question of non-examination remained intact.

MM. Grodet, Meissonier, and Barbedienne demanded that this opinion be only given if interested parties claimed it; but this addition was rejected.

The resolution was finally adopted as follows:—"A patent should be granted to every applicant, at his own risk and peril. It is, however, advisable that the applicant receive a previous and secret opinion, especially on the question of novelty, to enable him, at his discretion, to maintain, modify, or abandon his claim."

The Congress also adopted the following resolution:—"Patents should be subject to a fee, and also that this fee should be periodical and annual."

On Question 5, "The tax should be progressive, starting from a moderate sum" (which was adopted), Mr. Alexander had presented the following amendment, which was rejected, "The fees should not exceed the sum necessary to cover the expenses of the Patent-office."

The following resolution, proposed by M. Pataille, was adopted:—"The fees should only be demanded in the course of the year."

On Wednesday, 11th September, M. Bozérian presiding, the Congress was engaged with measures for an international understanding for the protection of inventions and trade marks.

Signor Romanelli, the delegate of Italy, brought forward a proposition as to the nomination of a permanent commission, charged with insuring the carrying out of the resolutions passed by the Congress, and the following proposition was carried :—"A permanent commission shall be nominated, charged with insuring, as far as possible, the realisation of the resolutions passed by the Congress."

Herr Carl Pieper, Secretary-General of the Vienna Patent Congress, said that the last resolution passed by the Congress had the object of pressing for the realization of all the resolutions that had been voted, and he begged the Paris executive committee to pursue the same objects.

After further discussion, the following was adopted :—"One of the objects of this commission, appointed through private initiative, will be to bring about, at the summons of one of the Governments, the meeting of an official international conference, for the purpose of determining the bases of a uniform legislation."

On the proposition of Admiral Selwyn, it was resolved that a deputation should wait upon the French Minister of Agriculture, begging him to take measures for the meeting of an international commission for insuring a uniform Patent-law.

The following proposition of M. Colfavru, of Cairo, was then adopted :—"The Congress express a desire that, with regard to Eastern countries which are not provided with laws for the protection of inventions, and especially Egypt, where there is a mixed international jurisdiction, diplomacy should intervene to secure from the Governments of these countries effectual measures for insuring to inventors and manufacturers a respect for their property."

A discussion then took place on the following proposition, and it was adopted :—"It is desirable that the deposit of petitions for patents, trade marks, and designs take place simultaneously with a competent local authority, and at the consulates of the various foreign nations."

The Congress next proceeded to discuss at length the right belonging to the inventor; it rejected a resolution as to an obligatory license for the whole duration of a patent, and another as to one for half the time, and ultimately passed the following :—"Patents should insure, during their whole duration, to inventors or their assigns, the exclusive right of working the invention, and not merely the right to a royalty to be paid by other parties working it."

MANUFACTURING DESIGNS AND MODELS.

On Thursday, 12th, the discussion of resolutions as to manufacturing designs and models was down on the paper, and the following resolutions were adopted :—"A definition of manufacturing designs and models should be given by the law which regulates them." "Every arrangement of lines or colours intended for an industrial production, and all the effects obtained by combinations of weaving or impression, shall be regarded as industrial designs; all works in relief intended to constitute or form part of an industrial object shall be regarded as industrial models; no design having an artistic character, or object due to the art of the sculptor, shall be included in these categories, although they may be intended for an industrial reproduction; as to inventions in which the form is only sought by the inventor with respect to the industrial result obtained, they shall be governed by the special law as to patents." "The duration of the right of ownership guaranteed by Art. 1, shall be of 2, 3, 4, 5, 10, 15, or 30 years, at the will of the applicant. If this right shall have been claimed for less than thirty years, it may be prolonged until the expiration of this period, on payment of the fees."

PATENTS.

The resolution, "The introduction into the country of patented objects manufactured abroad should not be forbidden by the law," was opposed by M. Pataille in the interest of national industry, but supported by M. Droz in consequence of the previous vote, which assimilated foreigners to natives, and adopted.

The following were also adopted :—"Forfeiture in default of paying the fees can only be pronounced after the expiration of a certain period following the date of forfeiture. Even after the expiration of this period, the patentee should be allowed a hearing to enable him to justify the causes which have prevented him from paying." It is advisable to admit the principle of forfeiture in default of working within a certain period to be determined unless, indeed, the patentee justify his inaction." This forfeiture shall be pronounced by the ordinary courts, and not by the Government."

MANUFACTURING DESIGNS AND MODELS.

On the 13th September the business before the Congress was the examination of the conditions under which the protection of the law should be granted to the inventors of manufacturing designs and models, when the following points were decided :—"The protection granted by the law to the inventors of designs and models should be subjected to the condition of a previous deposit." "The deposit should remain secret for two years." "The certificate of deposit shall be granted at the risk of the depositor." "At the expiration of the period determined for the open deposit, the designs and models shall be placed at the disposal of the public, but shall not be published officially." "Nevertheless the official journal at the service of the *propriété industrielle* of each country should publish periodically the names of the depositors, with an indication of the objects deposited." "It is desirable that, in every country, the striking out by the competent authority of fraudulent registrations, and also the substitution of the name of the rightful owner, be prescribed by law." "The weight of the deposit should not exceed ten kilogrammes." "Registrations of industrial designs or models should be subject to the payment of a fee." "It is not advisable to subject the authors of designs and models to forfeiture on account of non-working." "In order to benefit by the legal protection, the authors of registered designs and models should, as far as possible, mark them with a special sign. showing that they are registered, as well as the date and duration of the deposit." "The infringement of a patented invention, a trade mark, or an industrial design or model, that has been registered, is an offence against the common law."

TRADE MARKS.

On the 14th September, under the presidency of Herr Reuleaux, director of the Gewerbe Akademie of Berlin, the principle of ownership in trade marks was considered, and the following amongst other resolutions were adopted :—

"A trade mark cannot be claimed before the courts unless it has been properly registered."

"Every mark registered in a country ought also to be admitted, just as it is on the register, in the countries in union."

Dr. C. W. Siemens, in thanking the Congress for electing him one of the honorary presidents, regarded this honour as a compliment to the Vienna Congress, whose wishes he now hoped to see realised; and the meeting was adjourned to the 16th.

SEPTEMBER 16 AND 17.

At the meetings on these two days a number of resolutions, for the most part of minor importance, were adopted in relation to industrial rewards, the fraudulent use of medals conferred at exhibitions, &c., also in relation to trade marks and patents, and the Congress appointed a permanent commission to carry out its views. The members of the English section of this permanent commission are Admiral Selwyn, Mr. J. G. Alexander, Mr. Lewis Olrick, and Mr. Lloyd Wise; and there remain three vacancies to be filled up.—[Abridged from the *Journal of the Society of Arts.*]

LABOUR IN MASSACHUSETTS.

A FEW weeks ago Carroll D. Wright, Chief of the Massachusetts Bureau of Statistics, was called as a witness before the Congressional Labour Committee, and testified as follows :—

"In my official capacity I have given special attention to labour statistics, and am the author of the recent report which has been given to the public through the newspapers and otherwise. I have compared that report with the census of 1875, and find the two entirely in harmony. The number out of employment is about the same as in 1875, though the census of 1875 does not take into account the labouring men out of employment. In it there is a column of those never employed—persons of leisure. Both reports exclude those in almshouses; it may be that there are a few more now than in 1875; but the difference is very little. After the panic of 1873, there was an increase in the number of paupers all through the country; this has since been decreasing steadily. I have made very extensive inquiries throughout the United States, and have found no such condition of things as has been represented before this committee. I have no doubt the reports of destitution in the coal region are correct, but it is diminishing. I cannot tell the cause of this any more than I can tell how an apple grows. I have found as great difficulty in accounting for periods of prosperity as of suffering. I do not believe that the relief has come very greatly from the removal of the unemployed to other places. You cannot make a State prosperous by depopulating it."

Mr. Wright said that the shoe manufacturers of Massachusetts were enlarging their works, and the Amoskeag Print Works, at Worcester, N. H., was putting in 900 extra looms. Mr. Crompton, the loom manufacturer, had more orders than he could fulfil. The same improvement appeared in other States, and in all branches of trade, except the iron industry.

"Last year the work of labourers in Massachusetts on boots and shoes averaged eight hours a day; that of operatives in cotton mills from nine to ten hours a day; and that of carpenters and joiners about nine hours a day. Machinery does not take the place of labour; it calls for a higher class of labour. The wages of carpenters have increased from 1 dol. 75c. in 1859 to 3 dols. 50c. in 1868, and thence have fallen to 2 dols. in 1878. The purchasing power of the wages is not quite so great now as it was in 1859. The wages and the moral, intellectual, and physical condition of the working men have been steadily improved during the last 100 years by the use of machinery. In Massachusetts it would require a population of 9,000,000 to do the work without machinery, which is now done with a population of 1,650,000; the accumulated property of the State would be used up by this extra population in less than two years, and the condition would then be worse than in China and India now."

THE INVENTORS' INSTITUTE.

ESTABLISHED 1st MAY, 1862.

FORTNIGHTLY MEETINGS, DURING SESSION,
HELD (NOVEMBER TO MAY INCLUSIVE) AT

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